MODELS 17810C, 17810M, 17810MG, & 20872

BOOK NO. 94X802-951
RUN I
CHASSIS — P800S, U800S, G900S

television
SERVICE MANUAL

92X1508

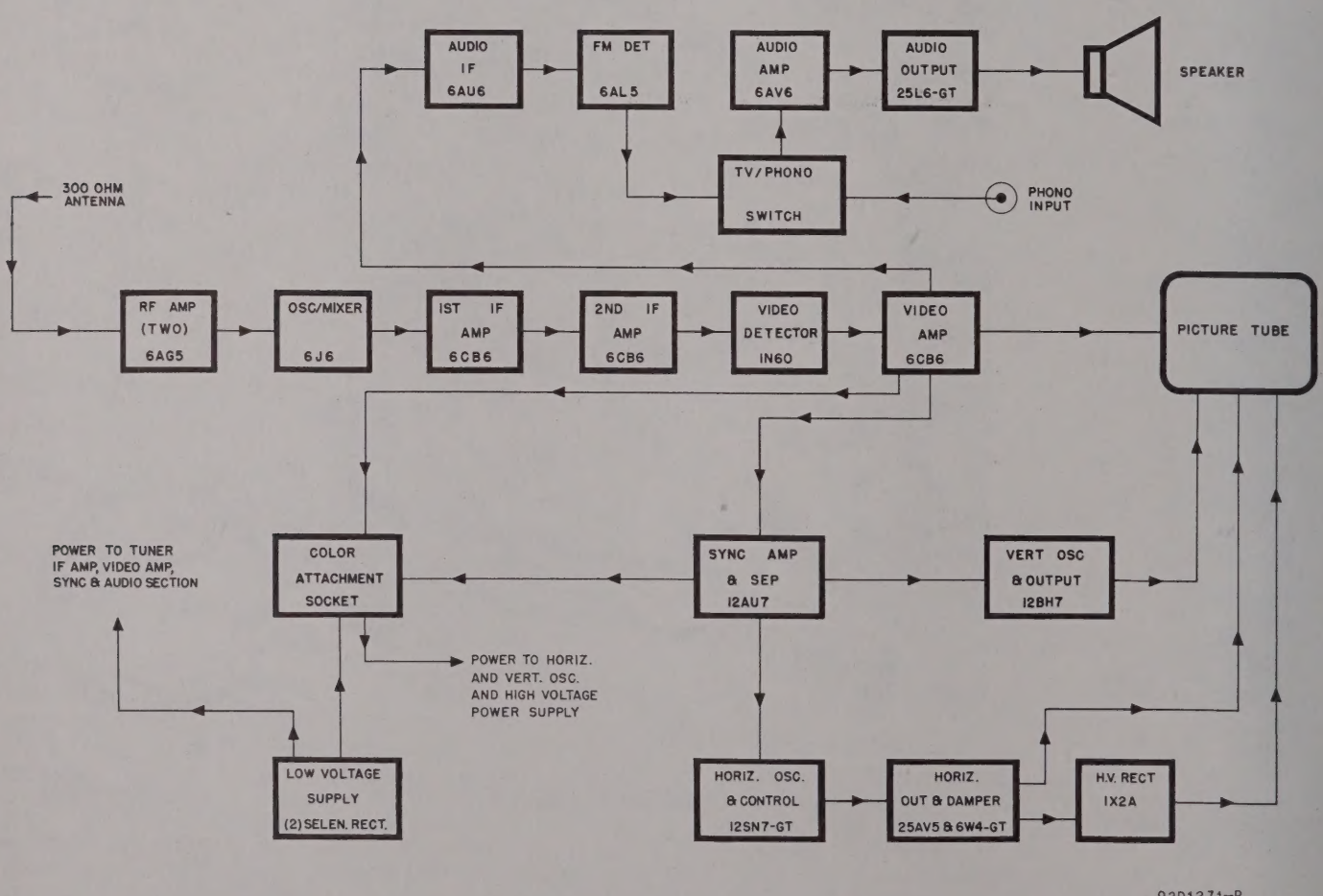
1951
SERIES

MODEL 20872 - - MAHOGANY
(SEE PAGE 2 FOR OTHER CABINET ILLUSTRATION)

the hallicrafters co.
MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 24, U. S. A.

92X1507

MODELS—17810C, 17801M & 17810MG



92D1371-B

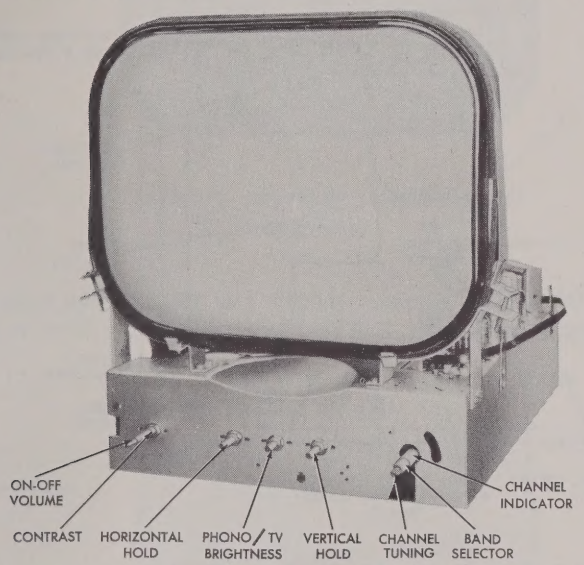
NOTE: FOR ALTERNATE TUBE TYPES REFER TO THE TUBE COMPLEMENT ON PAGE THREE

Fig. 1. Functional Block Diagram

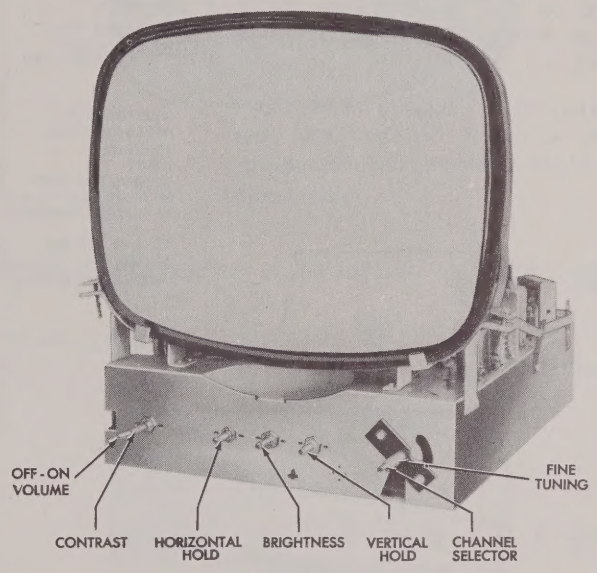
GENERAL SPECIFICATIONS

ANTENNA . . . . . EXTERNAL OR BUILT-IN SILVER VORTEX
ANTENNA INPUT IMPEDANCE. . . . . .300 OHMS
INTERCARRIER SOUND SYSTEM. . . . . 4.5 MC
PICTURE TUBE SIZE (MODEL 20872) . . . 19" ROUND
(MODELS 17810M & 17810MG). . 17" RECTANGULAR
(MODEL 17810C). . 16" RECTANGULAR
POWER SUPPLY . . . . . .110-120 V., 60 CYCLES
POWER INPUT . . . . . 150 WATTS

PICTURE CARRIER IF. . . . . 26.25 MC
SOUND CARRIER IF . . . . . 21.75 MC
SPEAKER (MODEL 20872). . . . . 10 INCH PM
SPEAKER (MODELS 17810C, 17810M AND 17810MG) . . . . . 5 INCH PM
TUNING. . . . . .12 CHANNELS, 2-13
TUBES . . . . . .17 INCLUDING 1 RECTIFIER PLUS 2 SELENIUM RECTIFIERS & 1 GERMANIUM DIODE

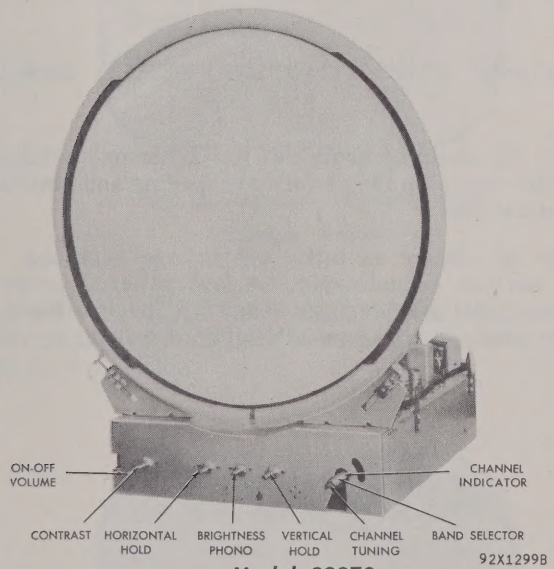


Models 17810C & 17810MG 92X1278



Model 17810M 92X1434

Note that this model does not have phono provisions.



Model 20872 92X1299B

HIGH VOLTAGE WARNING

OPERATION OF THE RECEIVER CHASSIS OUTSIDE OF THE CABINET INVOLVES DANGER OF ELECTRICAL SHOCK. EXERCISE ALL NORMAL HIGH VOLTAGE PRECAUTIONS WHEN WORKING WITH THIS RECEIVER.

Fig. 2. Front Operating Controls

V-1 *6AG5 or 6BC5 . . . . . RF AMPLIFIER
V-2 *6AG5 or 6BC5 . . . . . RF AMPLIFIER
V-3 6J6 . . . . . OSC./MIXER
V-101 6CB6 . . . . . 1ST IF AMPLIFIER
V-102 6CB6 . . . . . 2ND IF AMPLIFIER
V-103 6CB6 . . . . . VIDEO AMPLIFIER
V-104 12AU7 . . . . . SYNC. AMP. & SEP.
V-105 12BH7 (12SN7GT) . . . . VERT. OSC. & OUT.
V-106 6AU6 . . . . . AUDIO IF AMP.
V-107 6AL5 . . . . . .AUDIO FM DETECTOR
V-108 6AV6 . . . . . 1ST AUDIO AMP.

V-109 25L6GT . . . . . AUDIO OUTPUT
V-110 12SN7GT. . . . . .HORIZ. OSC. & CONTROL
V-111 25AV5GT (25BQ6GT) . . . HORIZ. OUTPUT AMP.
V-112 1X2A. . . . . .H. V. RECTIFIER
V-113 6W4GT. . . . . .DAMPER
V-114 16RP4, 16TP4 OR. . . . . .16" RECTANGULAR PICTURE TUBE
16UP4 FOR MODEL 17810C
V-114 17BP4A FOR MODELS . . . . 17" RECTANGULAR PICTURE TUBE
17810M and 17810MG
V-114 19AP4A FOR MODEL 20872 . . . . . .19" ROUND PICTURE TUBE

* Use type 6BC5 for replacement purposes in the TV tuner.

Tubes shown in parentheses in the above list are alternate types which are not directly interchangeable. When replacing tubes use the same types found in the receiver chassis.

SERVICE ADJUSTMENTS

Two different types of FOCUS CONTROLS are used in these models. One type consists of a knurled metal shaft protruding from the bottom portion of the dome shaped shield over the rear end of the picture tube. See Fig. 4.

The other type consists of an extra control mounted on the left rear apron of the chassis. See Fig. 3.

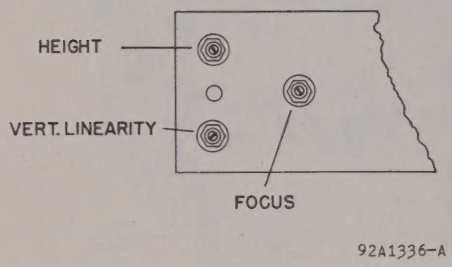


Fig. 3. Focus Control Location for EM-PM Focus Coil

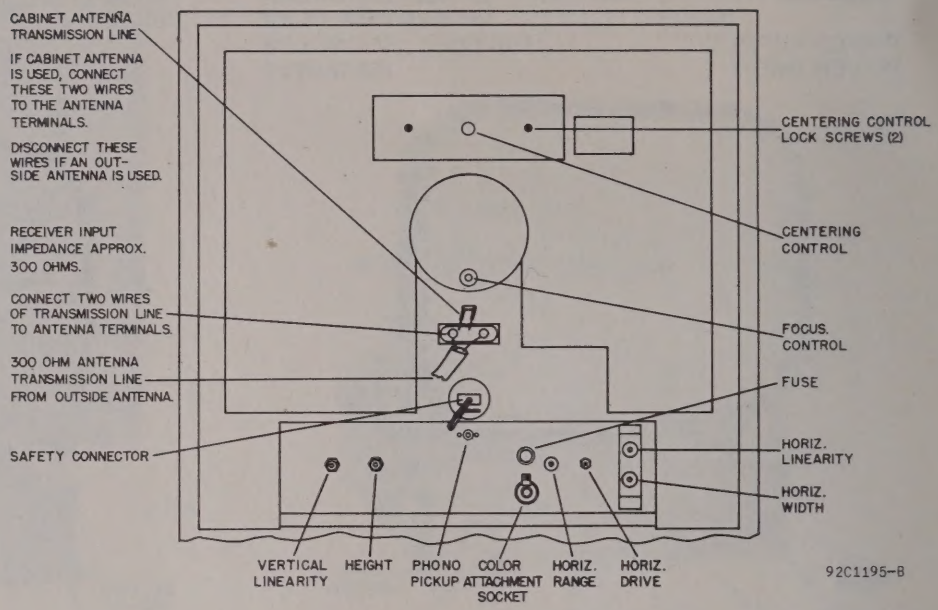


Fig. 4. Rear View with PM Focus Device

NOTE -- The COLOR ATTACHMENT SOCKET will be found only on model 17810C. The PHONO PICKUP socket will not be found on Model 17810M.

The adjustment for either type of focus control is the same. With all other controls set for a normal picture the FOCUS CONTROL should be adjusted until the horizontal lines which make up the picture are as fine and distinct as possible. Use the lines in the center portion of the picture for this adjustment.

The following service adjustments will require only occasional minor adjustment as tubes age or are replaced. Any circuit changes or repairs will probably necessitate resetting the service adjustments. A test pattern, generated either locally in the shop or obtained from a television station, is recommended for best results. The operating and auxiliary controls, located on the front panel, should be set for as good a pattern as possible before making any of the following adjustments.

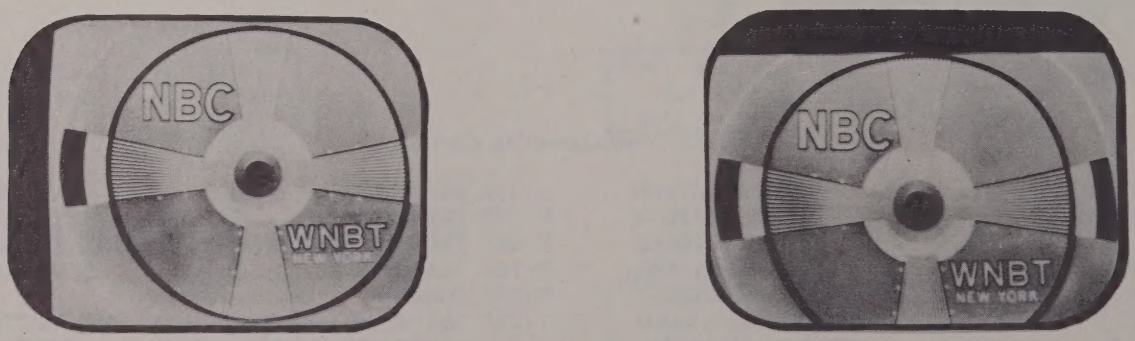


Fig. 5. Improper Centering Control Adjustment

If the picture is not properly centered remove the CENTERING CONTROL LOCK SCREW(S) and move the CENTERING CONTROL lever a short distance in any direction required to center the picture. Do not use force in making this adjustment as excessive strain may be exerted on the neck of the picture tube causing it to implode with dangerous and destructive violence. If proper centering cannot be restored in this manner a slight readjustment of the deflection yoke mounting may be necessary.

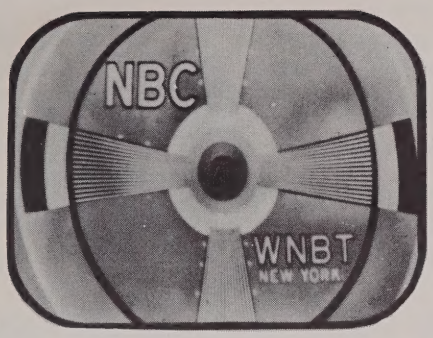


Fig. 6. Improper Height Control Adjustment

Fig. 7. Improper Width Control Adjustment

Adjust the HEIGHT and WIDTH controls so that the picture fills out the dimensions of the screen. A slight readjustment of the CENTERING CONTROL may then be necessary.

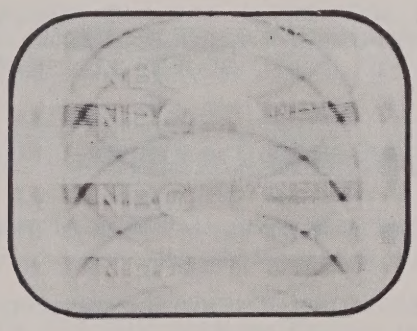


Fig. 8. Improper Vertical Hold Control Adjustment

Fig. 9. Improper Horizonal Hold Control Adjustment

Adjust the VERTICAL and HORIZONTAL HOLD controls for a single steady picture. When the HORIZONTAL HOLD control is properly adjusted it should be possible to switch from one station to another with the picture remaining steady on any station.

Fig. 10. Improper Vertical Linearity Control Adjustment

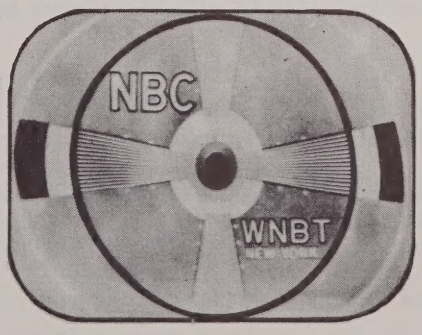


Fig. 11. Improper Horizontal Linearity Control Adjustment

Adjust the HORIZONTAL LINEARITY and VERTICAL LINEARITY controls for a symmetrical pattern. A slight readjustment of the HEIGHT and WIDTH controls may be necessary.

TEST PATTERNS COURTESY RCA SERVICE CO.

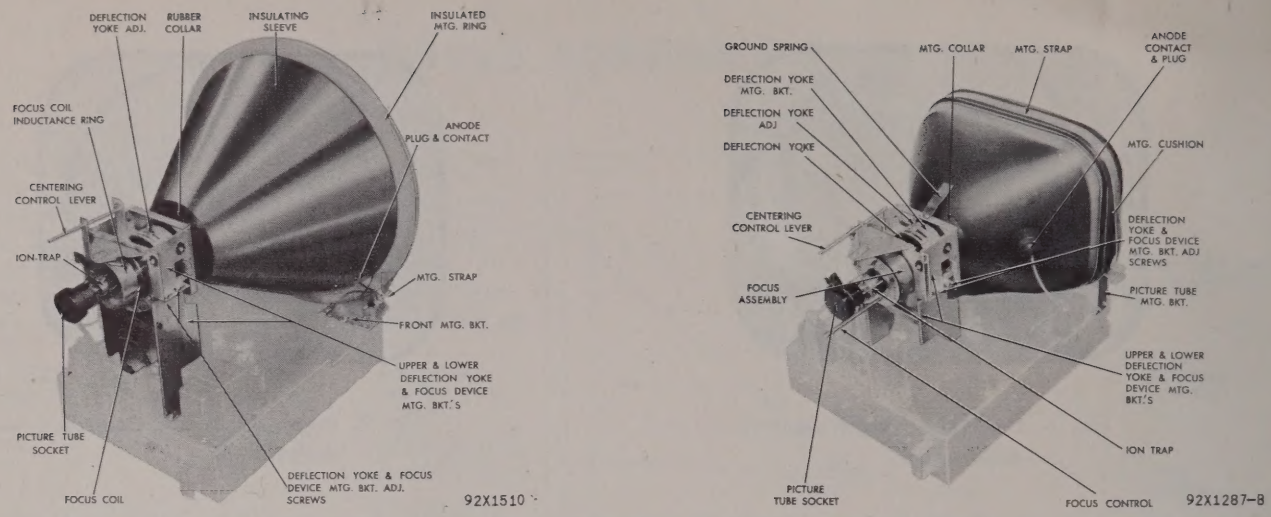


Fig. 12. Picture Tube Mounting Detail

WARNING

THE PICTURE TUBE ENVELOPE ENCLOSES A HIGH VACUUM. ANY ACCIDENTAL BLOW OR ROUGH HANDLING MAY CAUSE THE TUBE TO IMPLODE WITH DANGEROUS AND DESTRUCTIVE VIOLENCE. THE PICTURE TUBE SHOULD BE HANDLED ONLY BY QUALIFIED PERSONS PROTECTED BY HEAVY GLOVES AND SHATTERPROOF GOGGLES.

TO REMOVE THE CHASSIS FROM THE CABINET

1. Remove the knobs on the front panel by pulling them straight forward in line with the shafts on which they are mounted.
2. Loosen the panel, mounted on the cabinet back, through which the CENTERING CONTROL LEVER protrudes by removing the CENTERING CONTROL LOCK SCREW(S).
3. Remove the screw located directly above the SAFETY CONNECTOR.
4. Disconnect the antenna leads from the antenna terminal strip.
5. Remove the cabinet back by unscrewing the wood screws holding it in place.
6. Remove the speaker plug at the chassis. On the table models, remove the speaker mounting nuts and lift out the speaker.
7. Remove the five chassis mounting screws on the bottom of the cabinet and slide the chassis from the cabinet.

REMOVING THE PICTURE TUBE

1. Remove the chassis from the cabinet by following the above procedure.
2. Disconnect the ANODE PLUG (PL-104) from the side of the tube. On chassis with a glass picture tube, discharge the aquadag coating by shorting the ANODE CONTACT to the outer coating of the tube. On chassis with a metal cone picture tube, short the ANODE CONTACT to chassis ground.
3. Disconnect the TUBE SOCKET at the base of the tube.
4. Slip the ION TRAP from the neck of the tube.
5. Remove the MOUNTING STRAP from the front rim of the tube.
6. Loosen the four REAR SUPPORT ADJUSTMENT SCREWS. Raise the front of the tube just far enough to clear the picture tube mounting brackets and slip the tube forward until the neck is clear of the DEFLECTION YOKE and FOCUS DEVICE assembly.

CAUTION: If the tube fails to slip out smoothly, investigate and remove the cause of trouble. DO NOT USE FORCE.

INSTALLATION AND ADJUSTMENT OF THE PICTURE TUBE

1. FOR ROUND TUBES: Slip the INSULATING SLEEVE over the cone of the tube and fit the polyethylene MOUNTING RING around the front rim of the tube and over the INSULATING SLEEVE. Be sure that the ANODE CONTACT strap on the inner side of the INSULATING SLEEVE makes a good electrical contact with the rim of the metal tube cone. Position the polyethylene MOUNTING RING so that the ends of the ring come together approximately 90 degrees counterclockwise (when facing the front of the tube) from the ANODE CONTACT on the INSULATING SLEEVE.

   FOR RECTANGULAR TUBES: Place the RUBBER STRIP around the front rim of the tube. A large rubber band may be used to hold this strip in place. Position the tube so that the ANODE CONTACT is located at the left side of the tube when viewed from the front of the screen.

2. FOR ROUND TUBES: Slip the neck of the tube through the RUBBER COLLAR, DEFLECTION YOKE, and FOCUS DEVICE. Seat the groove of the polyethylene MOUNTING RING on the two rubber strips which are attached to the front tube mounting brackets. Position the tube so that the joint in the polyethylene MOUNTING RING is centered at the bottom, near the chassis.

   FOR RECTANGULAR TUBES: Slip the neck of the tube through the RUBBER COLLAR DEFLECTION YOKE, and FOCUS DEVICE. Seat the RUBBER STRIP on the two front mounting brackets. Be sure that the face of the tube rests against the rubber stop pads and not against the mounting brackets.

3. FOR ROUND TUBES: Place the MOUNTING STRAP in the polyethylene MOUNTING RING groove and tighten the take-up screws on each end of the MOUNTING STRAP.

   FOR RECTANGULAR TUBES: Place the MOUNTING STRAP around the RUBBER STRIP and tighten the take-up screws on each end of the MOUNTING STRAP.

4. Move the REAR SUPPORT so that the RUBBER COLLAR rests firmly against and supports the cone of the tube. Tighten the REAR SUPPORT ADJUSTMENT SCREWS.

5. Check the ION TRAP for any markings and slip the trap over the neck of the tube. If the trap is stamped with an arrow, the arrow should point towards the face of the tube.

6. Connect the PICTURE TUBE SOCKET and the ANODE PLUG (PL-104).

7. Turn the receiver on and allow a few minutes for warm-up.

8. Turn up the BRIGHTNESS control and set the ION TRAP for maximum raster brilliance, backing off the BRIGHTNESS control as the maximum point is approached. The ION TRAP must be rotated about the axis of the tube as well as shifted along the neck to obtain the proper setting. With the BRIGHTNESS control set for slightly above normal brilliance and the CONTRAST control full counterclockwise, adjust the FOCUS control until the lines of the raster are clearly visible. Readjust the BRIGHTNESS control for normal brightness and touch up the ION TRAP setting.

9. Connect the antenna and tune in a test pattern.

10. Readjust the CONTRAST control until the different shades of the gray scale are clearly visible in the test pattern.

11. Check the position and appearance of the test pattern. If it is off center or shadowed at the corners (electron beam striking the neck of the tube) adjust the CENTERING LEVER. On chassis with an EM-PM focus device, set the FOCUS control (Fig. 3) at the center of the range over which it may be rotated and adjust the FOCUS COIL INDUCTANCE RING (Fig. 12) as necessary so that a clear sharp picture may be obtained well within the range of the FOCUS control. On chassis with a PM focus device, adjust the FOCUS control (Fig. 4) until a clear sharp picture is obtained.

CAUTION - It will not be necessary to move the CENTERING LEVER excessively in any direction. Excessive force on the CENTERING LEVER may snap the neck of the picture tube.

12. If the lines of the raster are not horizontal or square with respect to the escutcheon, loosen the DEFLECTION YOKE ADJ. screw and rotate the DEFLECTION YOKE until the proper raster position is obtained. Tighten the screw after completing the adjustment.

13. Follow the procedure under "SERVICE ADJUSTMENTS" and make any minor adjustment of the FOCUS COIL or DEFLECTION YOKE necessary to obtain a properly adjusted picture.

PICTURE TUBE ANODE HIGH VOLTAGE MEASUREMENT

The second anode potential should be approximately 12,500 volts in a receiver that is functioning properly. If it is possible to obtain good picture brilliance the second anode potential is correct and need not be measured.

The setting of the HORIZONTAL DRIVE control will affect the high voltage on the second anode. Instructions for setting this control are given under the HORIZONTAL OSCILLATOR ADJUSTMENT instructions.

If it becomes necessary to measure the voltage present on the second anode a meter specifically designed for high voltage measurements should be used. The CONTRAST and BRIGHTNESS controls should be rotated to the extreme counterclockwise position and PL-104 should be connected to the picture tube. Under these conditions the test meter will load the high voltage power supply approximately the same amount as the picture tube does during normal operation.

CAUTION HIGH VOLTAGE

DO NOT USE HAND HELD FLEXIBLE TEST LEADS WHEN MAKING HIGH VOLTAGE MEASUREMENTS ON THE SECOND ANODE. AN 11 TO 14 KV. POTENTIAL EXISTS IN THIS CIRCUIT. ANY ACCIDENTAL CONTACT WITH SUCH A HIGH VOLTAGE CAN CAUSE A SEVERE BURN OR BE FATAL.

HORIZONTAL OSCILLATOR ADJUSTMENT

If the HORIZONTAL HOLD control on the front panel fails to restore synchronization the HORIZONTAL RANGE adjustment will have to be reset.

1. Position the HORIZONTAL HOLD control, located in the front of the receiver, in the center of the range over which it may be rotated.

2. Adjust the HORIZONTAL RANGE control, located in the rear apron of the chassis, until proper synchronization is obtained.

3. Test the synchronization on all active channels. The picture should remain in synchronization when switching from one active channel to another without any adjustment of the HORIZONTAL HOLD control or HORIZONTAL RANGE adjustment.

4. Repeat steps 1 and 2 if necessary.

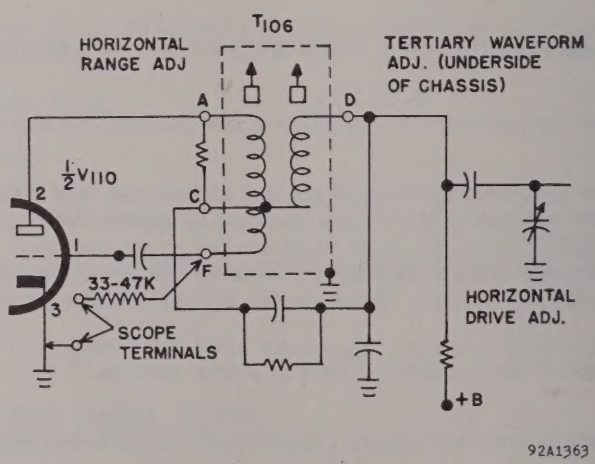


Fig. 13. Oscilloscope Connection for Horizontal Oscillator Adjustment

If the above procedure fails to restore stable synchronization, a waveform adjustment may be made with the aid of an oscilloscope.

5. Connect a VTVM to test point Ⓓ and adjust the HORIZONTAL DRIVE padder for -22.5 to -25 volts as read by the VTVM. (Refer to Figs. 28, 29, or 30.)

6. Connect the oscilloscope as shown in Fig. 13. Adjust the TERTIARY WAVEFORM slug (located under chassis) until the sine wave is equal in amplitude to the peak of the sawtooth (See Fig. 14.), while maintaining the picture in synchronization with the HORIZONTAL RANGE adjustment.

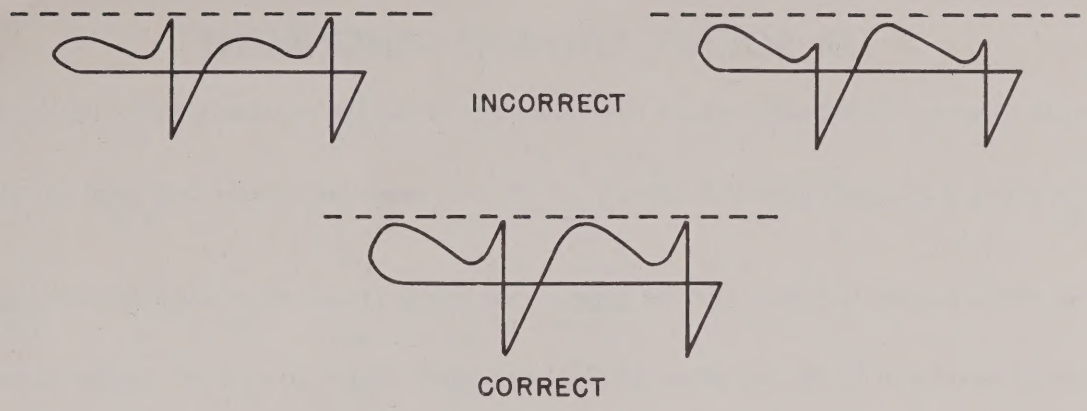


Fig. 14. Horizontal Oscillator Waveforms

This adjustment is very important for correct operation of the circuit. If the broad peak of the wave on the oscilloscope is lower than the sharp peak, the noise immunity becomes poorer, the stabilizing effect of the tuned circuit is reduced and drift of the oscillator becomes more serious.

On the other hand, if the broad peak is higher than the sharp peak, the oscillator is overstabilized, the pull-in range becomes inadequate and the broad peak can cause double triggering of the oscillator when the HORIZONTAL control approaches the extreme clockwise position.

7. Remove the oscilloscope and repeat step 5.

8. Repeat steps 1, 2, and 3 if necessary to provide positive synchronization on all active channels.

CHANNEL—CARRIER—OSC.—IF FREQUENCY CHART

Channel No.	Channel Freq. (mc)	Picture Carrier Freq. (mc)	Sound Carrier Freq. (mc)	Receiver Osc. Freq. (mc)	Picture IF Freq. (mc)	Sound IF Freq. (mc)	Picture IF less Sound IF (mc)
2	54-60	55.25	59.75	81.5	26.25	21.75	4.5
3	60-66	61.25	65.75	87.5	26.25	21.75	4.5
4	66-72	67.25	71.75	93.5	26.25	21.75	4.5
5	76-82	77.25	81.75	103.5	26.25	21.75	4.5
6	82-88	83.25	87.75	109.5	26.25	21.75	4.5
7	174-180	175.25	179.25	201.5	26.25	21.75	4.5
8	180-186	181.25	185.75	207.5	26.25	21.75	4.5
9	186-192	187.25	191.75	213.5	26.25	21.75	4.5
10	192-198	193.25	197.75	219.5	26.25	21.75	4.5
11	198-204	199.25	203.75	225.5	26.25	21.75	4.5
12	204-210	205.25	209.75	231.5	26.25	21.75	4.5
13	210-216	211.25	215.75	237.5	26.25	21.75	4.5

FM SOUND CHANNEL ALIGNMENT

A signal generator covering 4.5 MC and a vacuum tube voltmeter (VTVM) are required for this alignment.

1. Connect the output of the signal generator through a 0.005 mfd. capacitor between test point (A)* and chassis. See Fig. 15.

2. Connect the VTVM between test point (B) and chassis. See bottom chassis views and schematic diagrams.

3. Set the signal generator to 4.5 MC and adjust the generator output level to give a 1 volt reading on the VTVM.

4. Adjust the 4.5 MC SOUND ADJUSTMENT and the primary of T-101 (bottom adjustment) for a maximum indication on the VTVM. Reduce the output of the generator as the alignment progresses to keep the VTVM reading at approximately 1 volt.

5. Connect the VTVM between test point (C) (see schematic diagrams) and chassis. Adjust the secondary of T-101 (top adjustment) for a zero reading on the VTVM between a positive and negative peak. If the zero reading occurs at more than one setting, use the position nearest the top limit of the tuning slug.

6. Shift the signal generator frequency an equal amount on each side of 4.5 MC. and touch-up the primary of T-101 for approximately equal peaks.

I-F AMPLIFIER ALIGNMENT

A signal generator covering the frequencies listed in the chart below and a vacuum tube voltmeter (VTVM) are required for this alignment procedure.

1. Connect the VTVM between test point (A)* and chassis. See Fig. 15.

2. Place a tight fitting shield over the OSC./MIXER tube (V-2) and connect the ungrounded or "HOT" lead of the signal generator to this shield. This shield should not be grounded. Connect the ground side of the signal generator to the frame of the tuning unit.

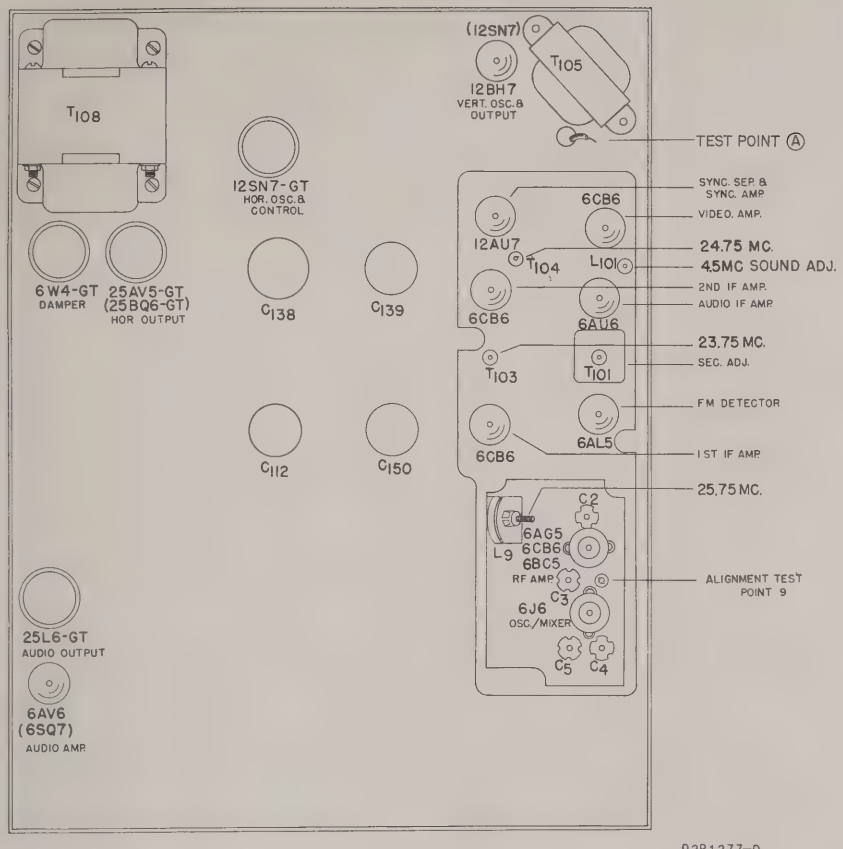
3. Turn the CHANNEL SELECTOR or CHANNEL TUNING control to any vacant channel.

4. Set the signal generator output (unmodulated) to develop approximately a 2 volt reading on the VTVM. Adjust the i-f amplifier coils at the frequencies given in the following chart. Adjust for a maximum VTVM reading and attenuate the generator output as required to maintain the 2 volt reading.

I-F AMPLIFIER ALIGNMENT CHART

Signal Generator Frequency (No Modulation)	Adjustment (Refer to Fig. 15)	
25.75 MC	L-9	(1st IF)
23.75 MC	T-103	(2nd IF)
24.75 MC	T-104	(Detector IF)

* Test point (A) is located on top of the chassis as shown in Fig. 15.



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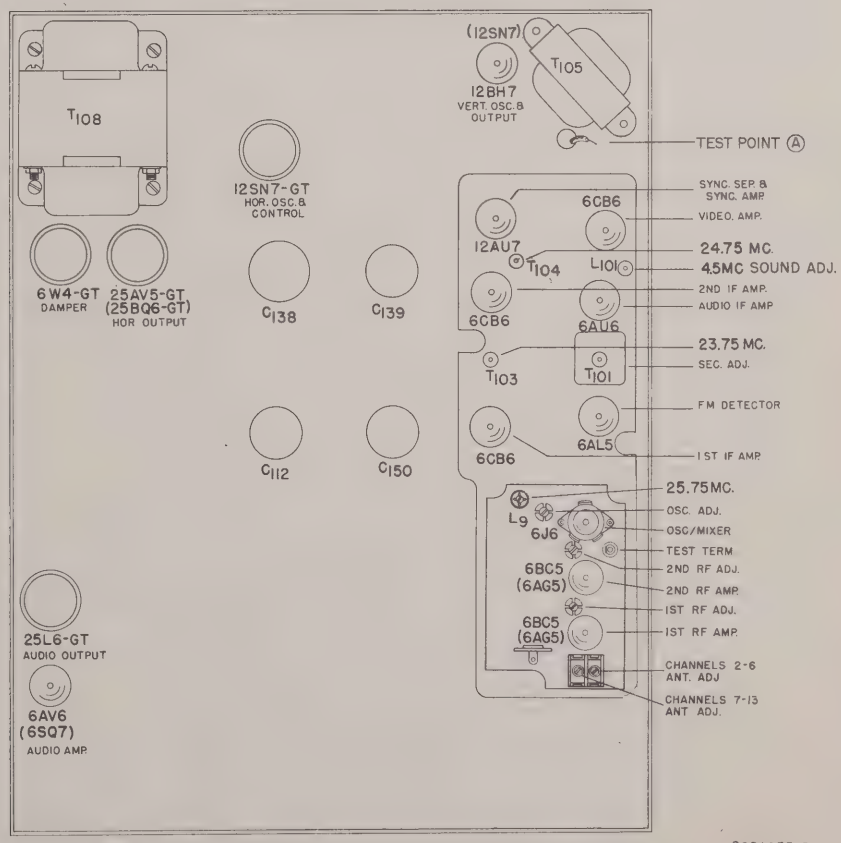
TOP VIEW OF CHASSIS WITH 1D1049 TWO TUBE TUNER

TOP VIEW OF CHASSIS WITH 1D1024 THREE TUBE TUNER



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92B1290

Fig. 15. Top View Alignment Locations

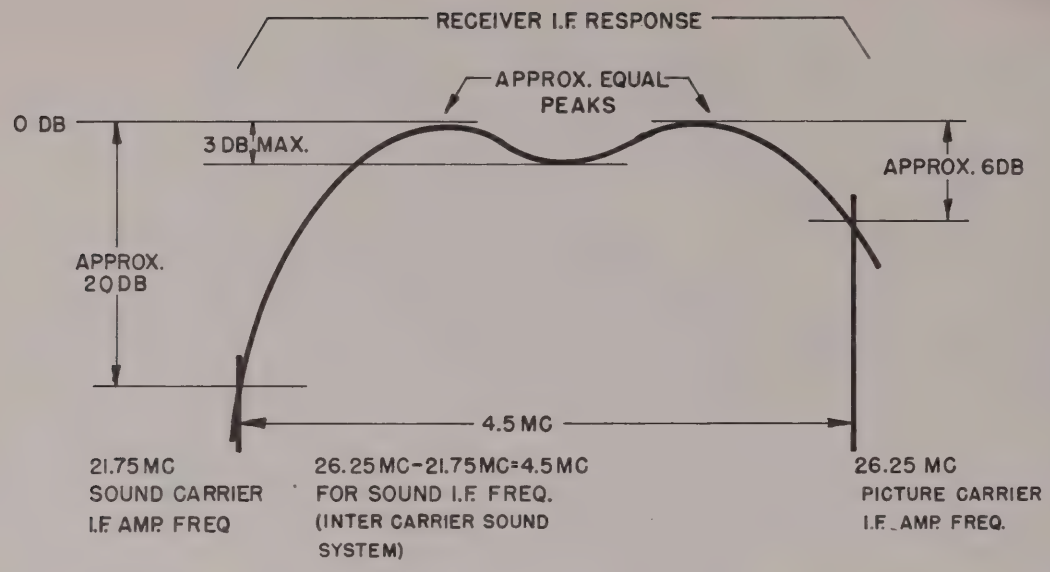


Fig. 16. IF Amplifier Response

TWO TUBE 1D1049 TUNER ALIGNMENT

The 1D1049 tuner is carefully aligned at the factory and should not require complete realignment under normal conditions. A slight readjustment of the individual oscillator slugs may be required as the tubes in the tuner age or are replaced. In some rare cases it will be necessary to realign the tuner after replacing either of the two tubes. If any service work is performed on the tuner, realignment may or may not be required. NO ATTEMPT TO REALIGN THE TUNER SHOULD BE MADE UNTIL THE BALANCE OF THE TV RECEIVER IS KNOWN TO BE IN PROPER OPERATING CONDITION AND IS PROPERLY ALIGNED.

When replacing the R.F. amplifier tube use the same type tube as the one found in the tuner. The other alternate tubes may be used for V-1 but the use of a tube other than the type found in the tuner may make it necessary to realign the R.F. and mixer portion of the tuner.

EQUIPMENT REQUIRED

1. Sweep generator covering all 12 television channels
2. Marker generator covering the same range as the sweep generator
3. Signal generator which has an output (unmodulated) on 26.25 MC
4. Oscilloscope
5. Vacuum tube voltmeter (VTVM)

R-F AND MIXER ALIGNMENT

1. Set the CHANNEL SELECTOR switch to channel 12.
2. Connect the oscilloscope through a 10,000 ohm resistor to test point 9. See Fig. 15.
3. Connect the negative side of a 1.5 volt battery to the terminal where the AGC lead (white wire) from the tuner and one lead from R-117 are connected. Refer to Figs. 28, 29, or 30. Connect the positive side of the battery to the chassis.
4. Set the FINE TUNING control at the approximate midpoint of its tuning range.
5. Connect the sweep generator to the antenna terminals and adjust the output to sweep channel 12.
6. Loosely couple the output from the marker generator to the antenna terminals. Use the minimum amount of coupling and signal from the marker generator required to give a plainly visible marker or pip on the oscilloscope pattern.

7. Adjust C-2, C-3, and C-4 (Fig. 15) for maximum gain and a flat-top response curve approximately 4.5 MC wide. All other channels should be checked to be sure they have approximately the same response. The correct marker frequencies for each channel are given in the Picture Carrier and Sound Carrier columns of the chart on bottom of page 9.

8. Disconnect the battery used to obtain negative bias.

9. Disconnect the test equipment and check the receiver performance on all active channels. If it is possible to receive a normal picture on all active channels by adjusting the FINE TUNING control, further alignment will not be necessary.

OSCILLATOR ALIGNMENT

1. Set the FINE TUNING control at the approximate midpoint of its tuning range.

2. Place a non-metallic screwdriver through the openings provided in the front of the chassis and the tuner assembly and adjust the oscillator coil slug for each active channel to give the best possible picture.

If the oscillator slug adjustment does not have sufficient range to tune in a good picture on any active channel it will be necessary to adjust C-5. The procedure for this adjustment is as follows:

WITH INSTRUMENTS

3. Set the CHANNEL SELECTOR switch to channel 12.

4. Connect the marker generator to one antenna terminal and ground. Set generator to 209.75 MC.

5. Connect the output of another signal generator to point Ⓐ through a 47,000 ohm resistor and adjust the generator frequency to 26.25 megacycles.

6. Connect the VTVM to point Ⓒ (see Figs. 28, 29, or 30) and adjust C-5 for a zero reading on the VTVM between a positive and negative peak.

7. Use only sufficient output from the signal generators to obtain a useable meter reading.

8. Repeat steps 1 and 2.

9. Repeat steps 3 through 8 if necessary.

WITHOUT INSTRUMENTS

3. Set the CHANNEL SELECTOR switch to any active channel on which a picture or test pattern can be received. Preferably select a station operating on the highest frequency or channel.

4. Adjust C-5 for the best possible picture.

5. Repeat steps 1 and 2.

6. Repeat steps 3 through 5 if necessary.

SERVICE PARTS LIST FOR 1D1049 TUNER

Hallicrafters Part Number	Description	Hallicrafters Part Number	Description
121A001	Fine tuning assembly shaft & cam	121A020	Channel 7 r-f & osc. coil
121A002	Drum & shaft assembly, less coils	121A021	Channel 8 r-f & osc. coil
121A003	Channel 2 antenna coil	121A022	Channel 9 r-f & osc. coil
121A004	Channel 3 antenna coil	121A023	Channel 10 r-f & osc. coil
121A005	Channel 4 antenna coil	121A024	Channel 11 r-f & osc. coil
121A006	Channel 5 ahtenna coil	121A025	Channel 12 r-f & osc. coil
121A007	Channel 6 antenna coil	121A026	Channel 13 r-f & osc. coil
121A008	Channel 7 antenna coil	121A027	Detent roller
121A009	Channel 8 antenna coil	121A028	Fiber washer
121A010	Channel 9 antenna coil	121A029	Spring, fine tuning ground
121A011	Channel 10 antenna coil	121A030	Spring, shaft retaining (2 req.)
121A012	Channel 11 antenna coil	121A031	Spring, detent
121A013	Channel 12 antenna coil	121A032	L-9 peaking coil
121A014	Channel 13 antenna coil	121A033	Slug, osc. coil adjustment
121A015	Channel 2 r-f & osc. coil	121A034	Spring, osc. coil slug retaining
121A016	Channel 3 r-f & osc. coil	121A035	Stator contact assembly
121A017	Channel 4 r-f & osc. coil	121A036	Fine tuning capacitor plate
121A018	Channel 5 r-f & osc. coil	121A037	Spring, detent ground
121A019	Channel 6 r-f & osc. coil		

NOTE: The last two numbers of the part numbers shown in the Service Parts List are used to identify the corresponding part in Fig. 17.

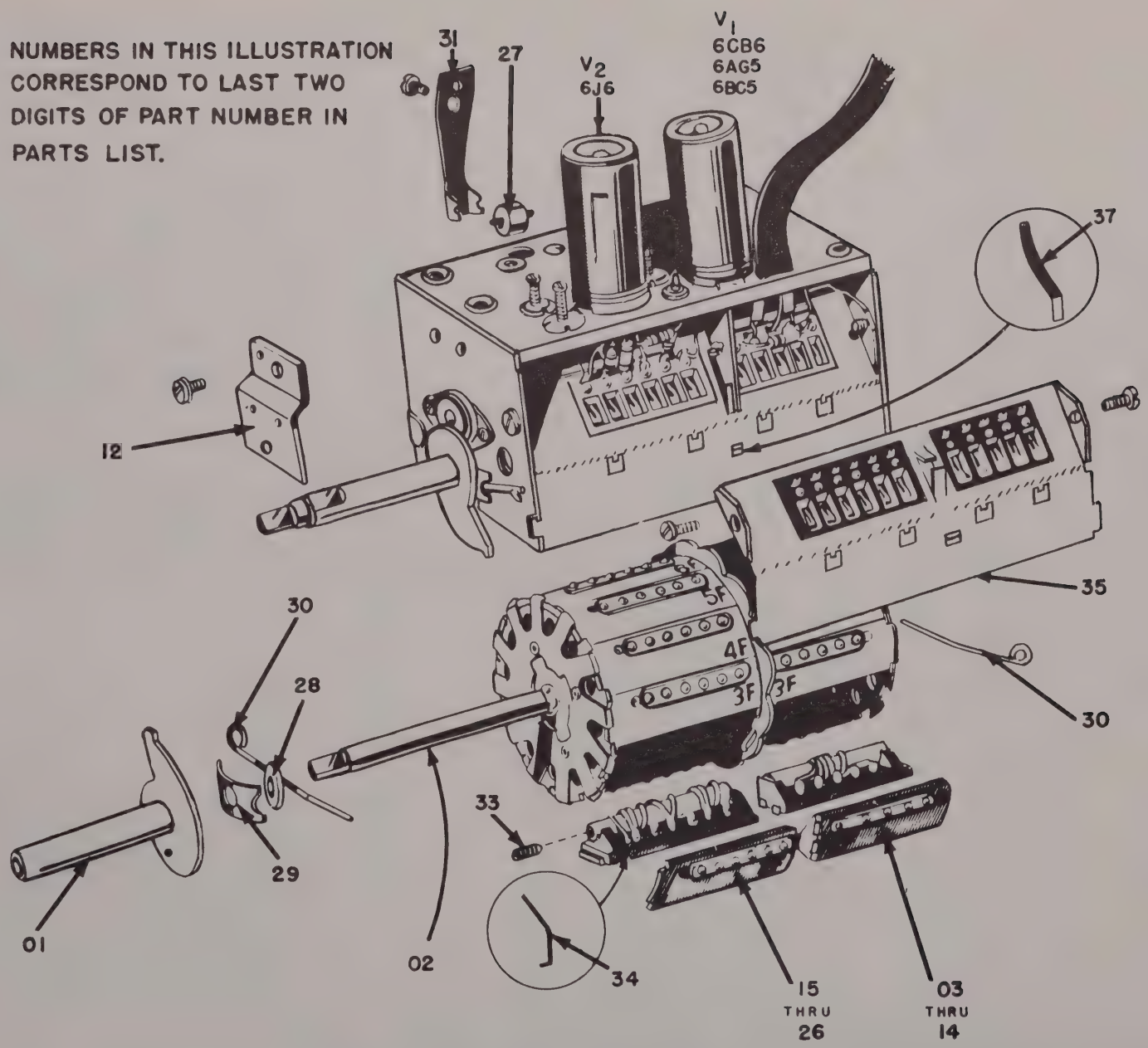


Fig. 17. Tuner Replaceable Parts I-F

THREE TUBE 1D1024 TUNER ALIGNMENT PROCEDURE

The 1D1024 three tube tuner is capacity tuned to cover channels 2 through 6 in the first (Lo) range and 7 through 13 in the second (Hi) range. Continuous tuning is provided in each range. In order to facilitate tuning, a certain amount of additional coverage above the highest and below the lowest tunable channel in each range is provided. The extra coverage is referred to as "overtravel" in the balance of these alignment instructions. A two position switch, actuated by a knob concentric with the CHANNEL TUNING shaft, is used to switch all circuits and will be referred to in this text as the BAND SELECTOR.

A 6AG5 or 6BC5 is used in the first r-f amplifier and second r-f amplifier stages. A 6J6 is used as an oscillator and mixer. Field replacement of the r-f amplifier tubes should be with 6BC5 tubes only. After start of the 1D1024 tuner production, the tube manufacturers reduced the transconductance (Gm) rating of 6AG5 tubes and designated the high Gm version as 6BC5. A reduction in receiver sensitivity will result unless 6BC5 tubes are used for replacement. The 6BC5 tube is completely interchangeable with the 6AG5 without any socket wiring changes.

A three gang capacitor is used for tuning the first r-f plate circuit, second r-f plate circuit, and the oscillator tuned circuit.

The antenna input system consists of two band-pass circuits. The required circuit is selected by the BAND SELECTOR. Each antenna circuit is double tuned by a trimmer capacitor across the center tapped primary winding and by the first r-f tube grid input capacity across the secondary winding. The antenna circuits are designed to match a 300 ohm transmission line. The antenna band-pass characteristics are shown in Fig. 18.

The r-f amplifiers are used as stagger tuned amplifiers to provide a band-pass circuit with the characteristics shown in Fig. 19. In both Hi and Lo ranges, the first r-f amplifier provides the low frequency stagger component and the second r-f amplifier provides the high frequency stagger component.

Fig. 18. Antenna Band Pass Characteristics

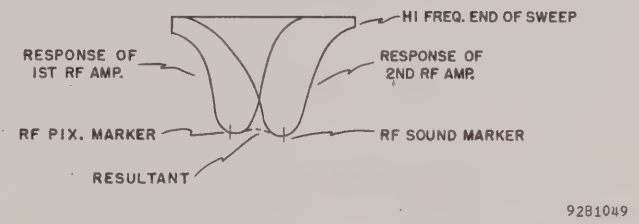


Fig. 19. R-F Band Pass Characteristics

With an r-f sweep input to the antenna input terminals and an oscilloscope properly connected to the mixer tube grid return at the LOOKER POINT as shown in Fig. 20.

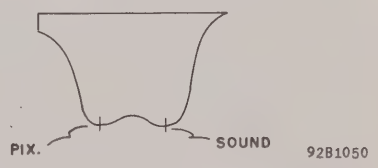


Fig. 20. Typical Overall Response

The oscillator employs a modified Colpitts circuit with the circuit tuned by one section of the variable capacitor.

EQUIPMENT REQUIRED FOR TUNER ALIGNMENT

1. Bias supply consisting of two 1.5 volt dry cells.

2. Oscilloscope equivalent in vertical deflection sensitivity and band-pass characteristics to the Dumont type 208-B.

3. R-F Marker Generator such as the RCA type WR-39B with crystal oscillators for calibration.

4. Sweep Generator similar to RCA type WR-59B, covering frequencies of 54 to 88 MC and 174 to 216 MC with a minimum sweep of 10 MC in any channel, and a 300 ohm balanced output of at least 0.1 volt line to line.

5. Vacuum Tube Voltmeter (VTVM) such as the RCA type WV-97A

6. 1N34 crystal detector circuit as shown in Fig. 21

EQUIPMENT CONNECTIONS

The following precautions must be taken when connecting the test equipment for aligning the 1D1024 tuner. Refer to Fig. 21.

1. The detector circuit should be so constructed that all leads are as short as possible. Connection of the detector circuit to the first i-f amplifier tube grid terminal (pin 1) should also be made with short leads.

2. Shielded leads should be used to reduce hum and synchronizing voltage pick-up when making the following connections:

   A. The lead for observations of the r-f response from the scope isolating resistor (10,000 ohms located at the tuner LOOKER POINT) to the RF output switch position of the SCOPE SWITCH.

   B. The connection from the i-f detector circuit output to the IF switch position of the SCOPE SWITCH.

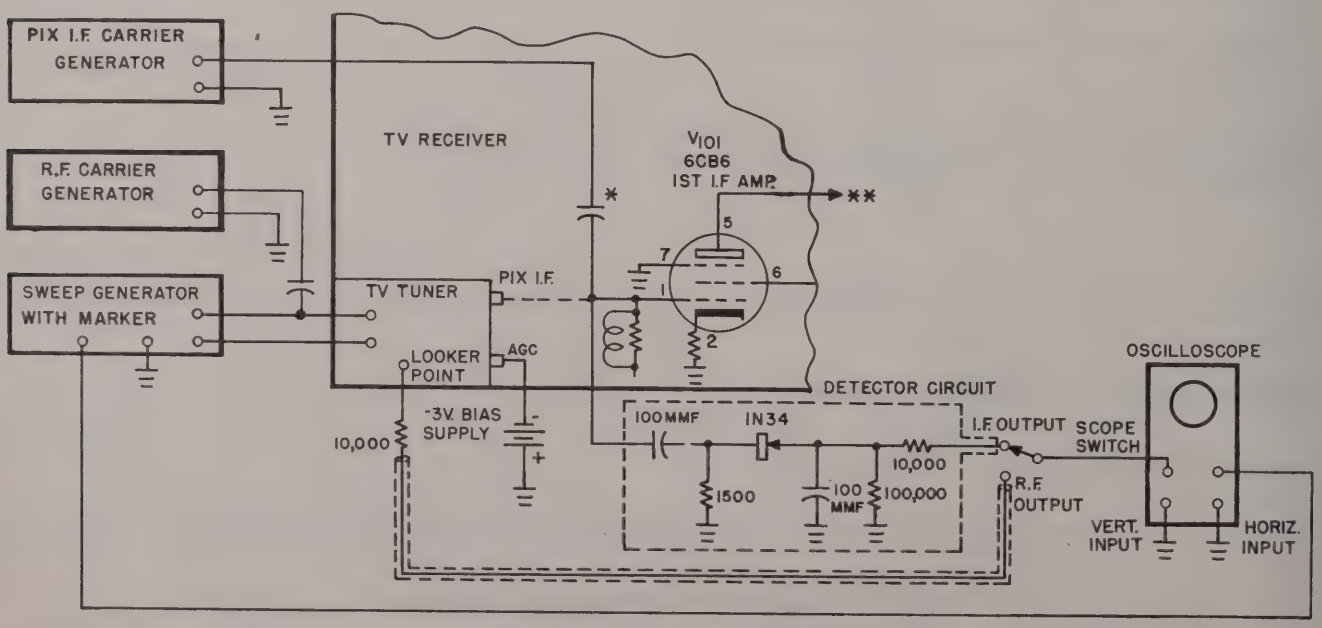
   C. The connection from the sweep generator to the horizontal input of the scope. (Use the sweep voltage generated in the sweep generator rather than the internal oscilloscope sweep voltage in order to obtain a synchronized scope pattern).

3. The single pole double throw SCOPE SWITCH should be located at the vertical input terminals of the scope. This switching arrangement will permit observation of either the i-f response or the overall r-f response. The aforementioned positions will be referred to in subsequent text as the IF and RF positions respectively.

4. The marker generator coupling capacitor should be as small in value as possible to prevent any effect on tuner response, but must be large enough to permit easy observation of markers on either the i-f response or overall r-f response. A value of 2 or 3 mmfd. should be satisfactory in most cases.

5. Short the grid (pin 1) of the second i-f amplifier tube (V-102) to ground to prevent coupling between the receiver i-f system and the tuner for all of the adjustments outlined in the instructions which follow.

6. Keep the oscilloscope vertical gain as close to maximum as possible to allow the use of a low level signal from the r-f sweep generator and increase the visibility of the i-f and r-f markers.



* SEE TEXT ITEM 4 UNDER EQUIPMENT SET UP
** SEE TEXT ITEM 5 UNDER EQUIPMENT SET UP

92B1054-A

Fig. 21. Recommended Test Equipment Connections

HI BAND OSCILLATOR ALIGNMENT

1. Turn the BAND SELECTOR to the Hi band (counterclockwise), rotate the variable capacitor to minimum capacity (clockwise), and adjust the sweep generator for channel 13.

2. With the scope switch in the IF position, adjust scope gain, r-f sweep input level, inject required 26.25 MC i-f picture marker, and an r-f overtravel marker of 212.75 MC.

OVERTRAVEL CHART FOR OSCILLATOR COVERAGE

Channel No.	Overtravel	RF Overtravel Marker Frequency
13	+1.5 MC	Pix carrier +1.5 MC = 212.75 MC
7	-2.5 MC	Pix carrier -2.5 MC = 172.75 MC
6	+1.5 MC	Pix carrier +1.5 MC = 84.75 MC
2	-1.0 MC	Pix carrier -1.0 MC = 54.25 MC

3. Adjust the OSC. TRIMMER (See Fig. 24) so that the picture i-f marker and 212.75 MC overtravel marker coincide on the i-f response characteristic as seen on the scope.

4. Loosen the two self tapping screws used for fastening the tuner shield until a point is reached where the coils on the switch are exposed and accessible.

5. Rotate the variable capacitor to maximum capacity (counterclockwise) and adjust the sweep generator for channel 7.

6. Inject the 172.75 MC r-f overtravel marker.

7. With a bakelite or similar low loss alignment tool, adjust the spacing of the turns of the HI BAND OSC. COIL (Fig. 24) so that the picture i-f marker and the 172.75 MC overtravel marker coincide. Spreading the turns apart will raise the oscillator frequency while moving them together will lower the oscillator frequency. After adjustment, slide shield back into its normal operating position and note any frequency shift of the markers. Slide the shield off and compensate for the frequency shift by a slight readjustment of the Hi band oscillator coil. Slide the shield back into position and note if the markers coincide. If they do not, repeat the process until proper adjustment is obtained and the markers coincide.

8. Repeat steps 1 to 7 inclusively until correct oscillator coverage of the entire Hi band is obtained.

LO BAND OSCILLATOR ALIGNMENT

9. Remove the tuner shield completely, turn the BAND SELECTOR to the Lo band position (clockwise), rotate the variable capacitor to minimum capacity (clockwise) and set the sweep generator to channel 6.

10. Inject the 26.25 MC picture i-f marker and the 84.75 MC r-f overtravel marker.

11. With a bakelite or similar low loss alignment tool, adjust the spacing of the LOW BAND OSC. COIL (Fig. 24) so that the picture i-f marker and the 84.75 MC marker coincide.

12. Rotate the variable capacitor counterclockwise and set the sweep generator for channel 2.

13. Inject the 54.25 MC r-f overtravel marker.

14. Adjust the LOW BAND OSC. SERIES PAD (See Fig. 24) until the picture i-f marker and the 54.25 MC overtravel marker coincide.

15. Repeat steps 9 through 14 until correct coverage of the entire Lo band is obtained.

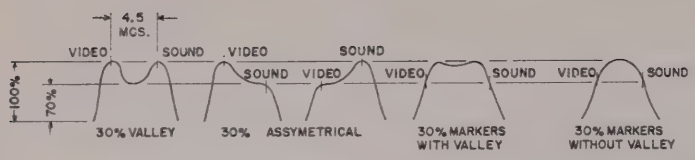


Fig. 22. Acceptable R-F Response

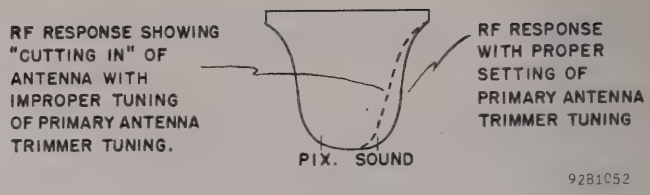


Fig. 23. Effect of Primary Antenna Trimmer on R-F Response

R-F ALIGNMENT FOR HI BAND

16. Repeat step 1 under HI BAND OSCILLATOR ALIGNMENT.

17. Replace the tuner shield, set scope switch to the IF position and adjust the scope gain.

18. Inject the picture i-f marker (26.25 MC) and a channel 13 r-f marker (211.25 MC).

19. Rotate the tuning shaft until the picture i-f marker and the 211.25 MC marker coincide on the pattern seen on the scope. Do not disturb this setting of the variable capacitor for the remainder of channel 13 alignment.

20. Set the scope switch to the RF position, adjust the scope gain and turn the 1st RF TRIMMER (See Fig. 24) for maximum amplitude of the first r-f amplifier response in the region of the r-f picture marker.

21. Inject channel 13 sound r-f marker (215.75 MC) and adjust the 2ND RF TRIMMER (See Fig. 24) for maximum amplitude of the second r-f amplifier response in the vicinity of the r-f sound marker.

22. Repeat setps 20 and 21 until the desired band-pass is obtained. Refer to Fig. 22.

23. Remove the tuner shield as in step 4 and repeat step 5 under HI BAND OSCILLATOR ALIGNMENT.

24. Set the scope switch to the IF position, adjust the scope gain, and inject the 26.25 MC picture i-f marker and channel 7 r-f marker of 175.25 MC.

25. Rotate the tuning shaft until the picture i-f marker and channel 7 picture marker coincide. Do not disturb this setting of the variable capacitor for the remainder of channel 7 alignment.

26. Set the scope switch to the RF position and with a bakelite or similar low loss alignment tool, adjust the 1st RF HI BAND COIL (See Fig. 24) for maximum amplitude of the first r-f amplifier in the region of the picture r-f marker.

27. Inject a channel 7 r-f sound marker of 179.75 MC and adjust the 2nd RF HI BAND COIL (See Fig. 24) for maximum amplitude of the 2nd r-f amplifier response in the region of the sound r-f marker.

28. Repeat steps 26 and 27 until the desired band-pass is obtained, consistent with the shapes shown in Fig. 22.

29. Repeat steps 16 through 28 for satisfactory coverage of the entire Hi band r-f response.

R-F ALIGNMENT FOR LO BAND

30. Repeat step 9 under LO BAND OSCILLATOR ALIGNMENT, set scope switch to the IF position, adjust scope gain, and inject an 83.25 MC channel 6 picture r-f marker.

31. Rotate the tuning shaft until the picture i-f marker and the 83.25 MC marker coincide. Do not disturb this variable capacitor setting for the remainder of channel 6 r-f alignment.

32. Set the scope switch to the RF position and adjust the scope gain.

33. Adjust the 1st RF LO BAND COIL (See Fig. 24) for maximum amplitude of the 1st r-f amplifier response in the region of channel 6 picture r-f marker.

34. Inject a channel 6 sound r-f marker of 87.75 MC and adjust the 2ND RF LO BAND COIL (See Fig. 24) for maximum amplitude of the 2nd r-f amplifier response in the region of the channel 6 sound r-f marker.

35. Repeat steps 33 and 34 until the desired band-pass is obtained as shown in Fig. 22.

36. Rotate the variable capacitor fully counterclockwise for maximum capacity and adjust the sweep generator to channel 2.

37. Set the scope switch to the IF position, adjust scope gain, and inject a 55.25 MC channel 2 picture r-f marker.

38. Rotate the fine tuning capacitor until the picture i-f marker and the 55.25 MC marker coincide. Do not disturb this variable capacitor setting for the remainder of the channel 2 r-f alignment.

39. Set the scope switch to the RF position and adjust the scope gain.

40. Adjust the 1ST RF LO BAND COIL (See Fig. 24) for maximum amplitude of the 1st r-f amplifier response in the region of the channel 2 picture r-f marker.

41. Inject a channel 2 sound r-f marker of 59.75 MC and adjust the 2ND RF LO BAND COIL (See Fig. 24) for maximum amplitude of the 2nd r-f amplifier response in the region of the channel 2 sound r-f marker.

42. Repeat steps 40 and 41 until desired band-pass is obtained as shown in Fig. 22.

43. Repeat steps 30 through 42 for satisfactory coverage of the entire Lo band r-f response.

R-F ALIGNMENT OF ANTENNA CIRCUIT

The band-pass antenna stages are normally aligned in the factory for minimum standing waves with a wide range sweep oscillator and a delay line. The coupling between the primaries and secondaries is carefully adjusted and in general should not be disturbed. Minor corrections of the primary trimmer capacitors may be necessary, if they are accidentally or otherwise varied after leaving the factory. The procedure for resetting the antenna primary trimmers is outlined below.

With the scope switch in the RF position and the equipment set for observation of channel 13 r-f band-pass (See step 1 under HI BAND OSCILLATOR ALIGNMENT) turn HI BAND PRIMARY ANT. TRIMMER screw counterclockwise to a reduced capacity setting. Start turning the screw clockwise (increasing capacity) while observing the channel 13 r-f band-pass amplitude and shape. The amplitude will increase to a certain point and thereafter the shape of the response will change as shown in Fig. 23, indicating the antenna circuit to be cutting into the r-f band-pass. Back out the trimmer screw for a compromise setting for maximum overall gain and minimum "cutting in".

The procedure for aligning the LO BAND PRIMARY ANT. TRIMMER is the same as outlined for the Hi band primary antenna trimmer except the tuner should be tuned to channel 6 and adjustment of the Lo band antenna trimmer should be made while observing the r-f response characteristics of channel 6.

FINAL AIR CHECK

Upon completion of the tuner alignment, remove the crystal detector connected to the grid of the first i-f tube. Replace the tuner shield and fastening screws. Remove the shorting wire between the grid of the second i-f amplifier tube and the chassis ground. Check the performance of the receiver on all active local channels.

CAUTION

DO NOT ATTEMPT TO BEND THE VARIABLE CAPACITOR PLATES, AS THEY HAVE BEEN CALIBRATED AT THE FACTORY WITH SPECIAL EQUIPMENT.

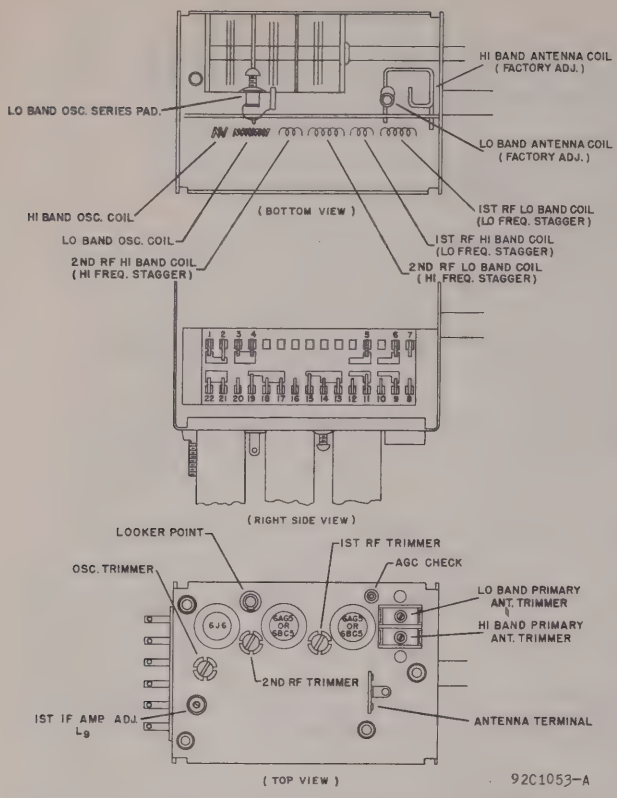


Fig. 24. Location of Tuner Alignment Adjusments

OSCILLATOR INJECTION VOLTAGE

The oscillator injection voltage must be no less than the minimum value of 2 volts with normal B+ applied. This voltage is measured between the LOOKER POINT (See Fig. 24) and ground with a vacuum tube voltmeter through a 10,000 ohm isolating resistor. In the event that the measured voltage is less than 2 volts it will be necessary to replace the 6J6 tube.

NOTE - If the 6J6 tube is replaced, it may be necessary to realign the tuner to compensate for the difference of the tube characteristics. A slight adjustment of the oscillator trimmer (See Fig. 24) will correct for any change of tube capacitance. Follow instructions for alignment of Hi Band and Lo Band oscillator alignment.

Low oscillator injection voltage will reduce conversion gain with a resulting loss in picture sensitivity.

REPLACING TUBES

See the note under Oscillator Injection Voltage concerning replacement of the 6J6 oscillator-mixer tube.

If either r-f tube is replaced, it may be necessary to realign the tuner. A slight adjustment of the r-f trimmers (See Fig. 24) as instructed under Hi and Lo Band r-f alignment instructions will be all that is required.

RESTRINGING CAPACITOR PULLEY DRIVE

Wrap drive cord assembly 1-1/2 turns on the drive pulley (See Fig. 25) and slip other end over pulley on rotor shaft, keeping prong clip in center of slot; hook one end of spring over cord, and the other end over tab on pulley.

RESTRINGING POINTER PULLEY DRIVE

With the tuning capacitor at maximum capacity and the slots in the pointer sleeve pulley in the position shown in Fig. 25, press prong clip on pointer cord assembly into slots and wrap end of loop around end of capacitor rotor shaft making certain that the cord is seated in the groove provided in the rotor shaft. Loop loose end of cord assembly over anti-backlash pulley as shown in Fig. 25. Apply a drop of "Duco" or similar type cement over cord seated in groove in rotor shaft to prevent the cord from slipping.

RESETTING POINTER SLEEVE EXTENSION

If the pointer cord breaks, it may be necessary to reset the pointer sleeve extension after restringing in order to maintain coincidence of pointer and dial escutcheon.

1. Tune unit to channel 13 (either station or signal generator source).
2. Unsolder pointer sleeve extension and rotate until pointer registers on number 13 of dial escutcheon. Resolder pointer sleeve extension to pointer sleeve after adjustment.

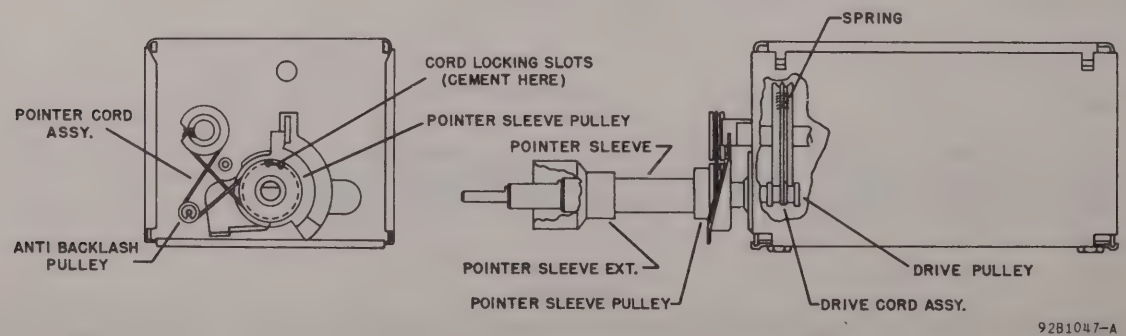


Fig. 25. Dial and Tuning String Drive Detail

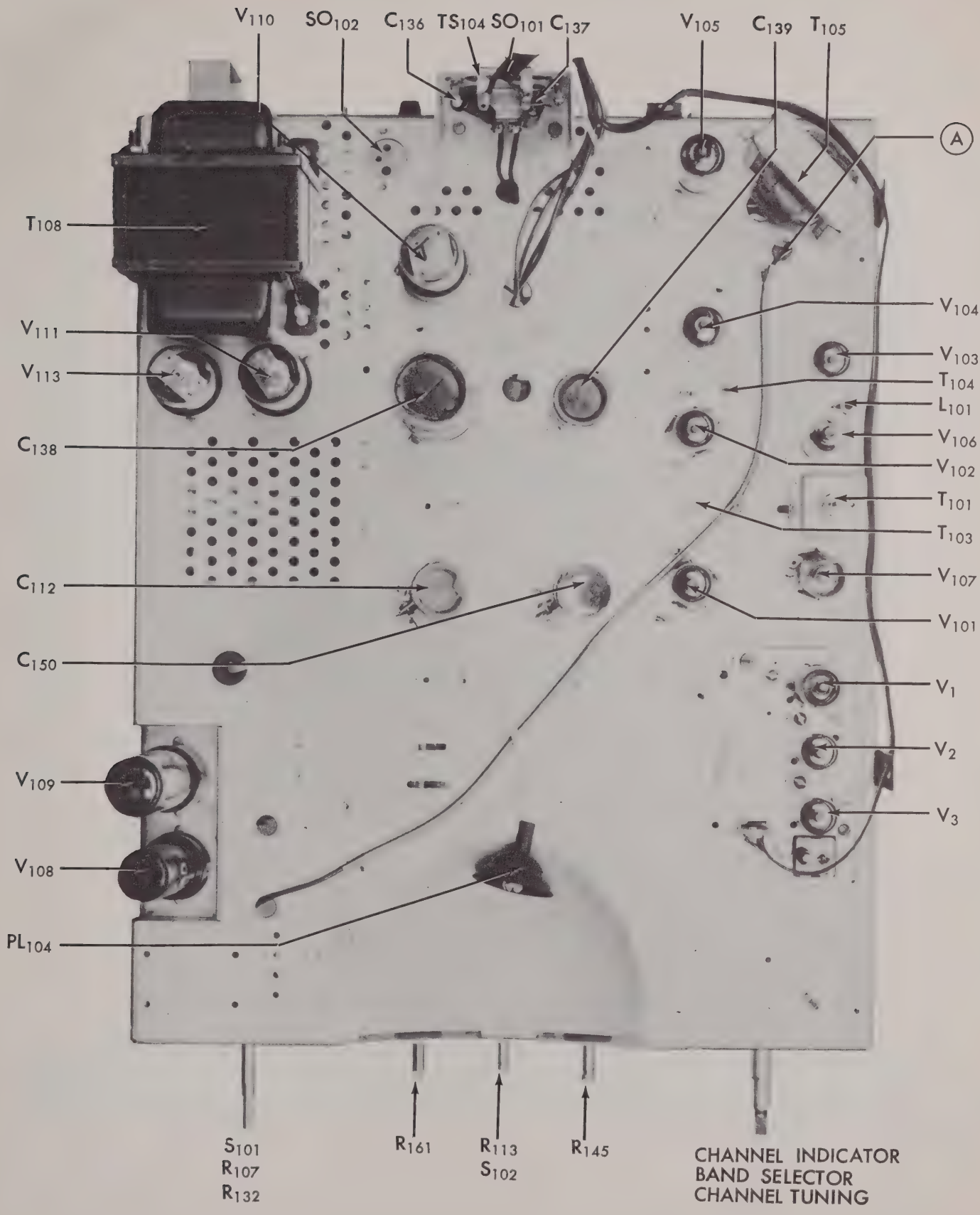


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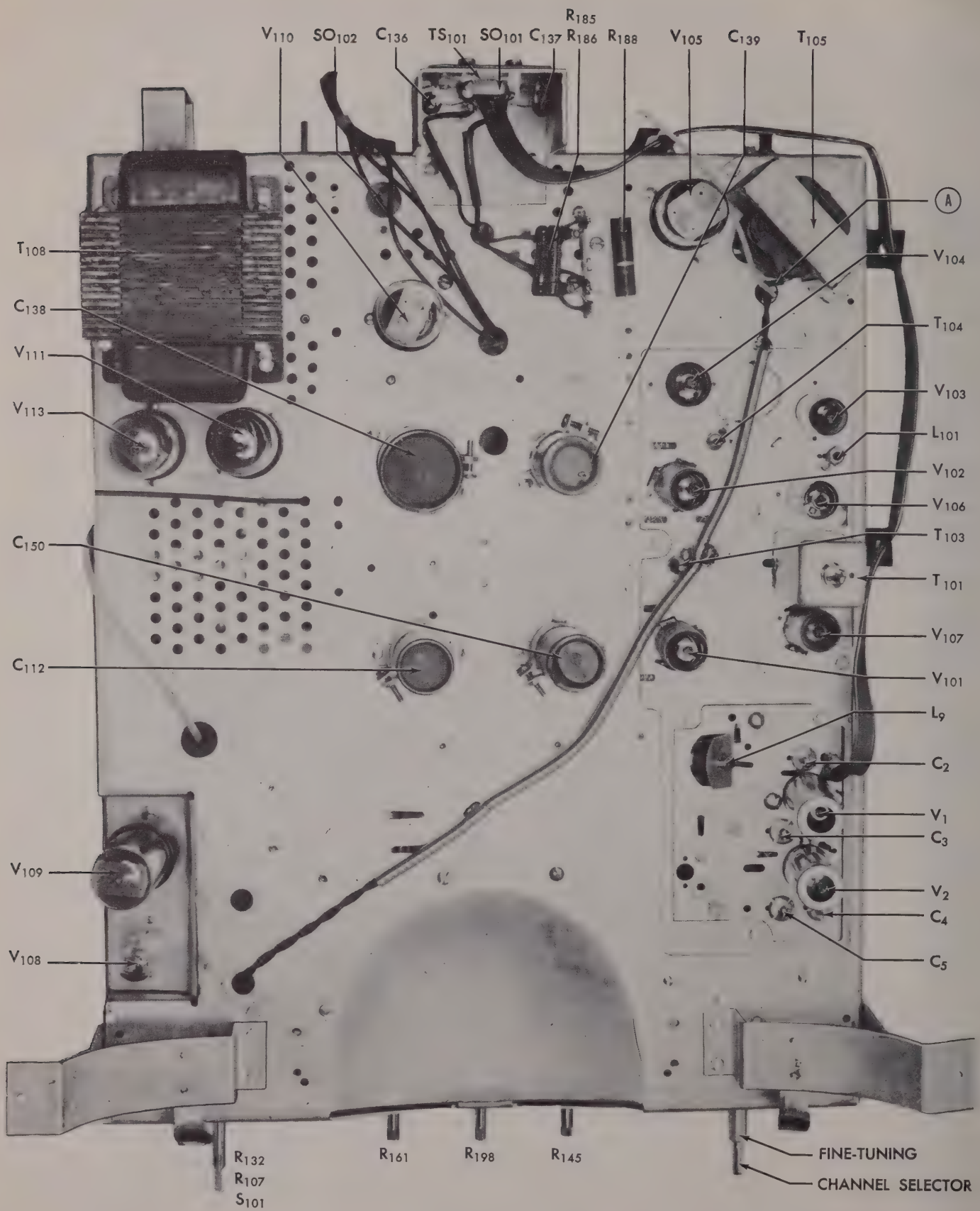
Fig. 26. Top Chassis View Showing 1D1024 Tuner in Place on a Chassis with PM Focus and Phono



92X1445

Fig. 27. Top Chassis View Showing 1D1049 Tuner in Place on a Chassis with EM-PM Focus

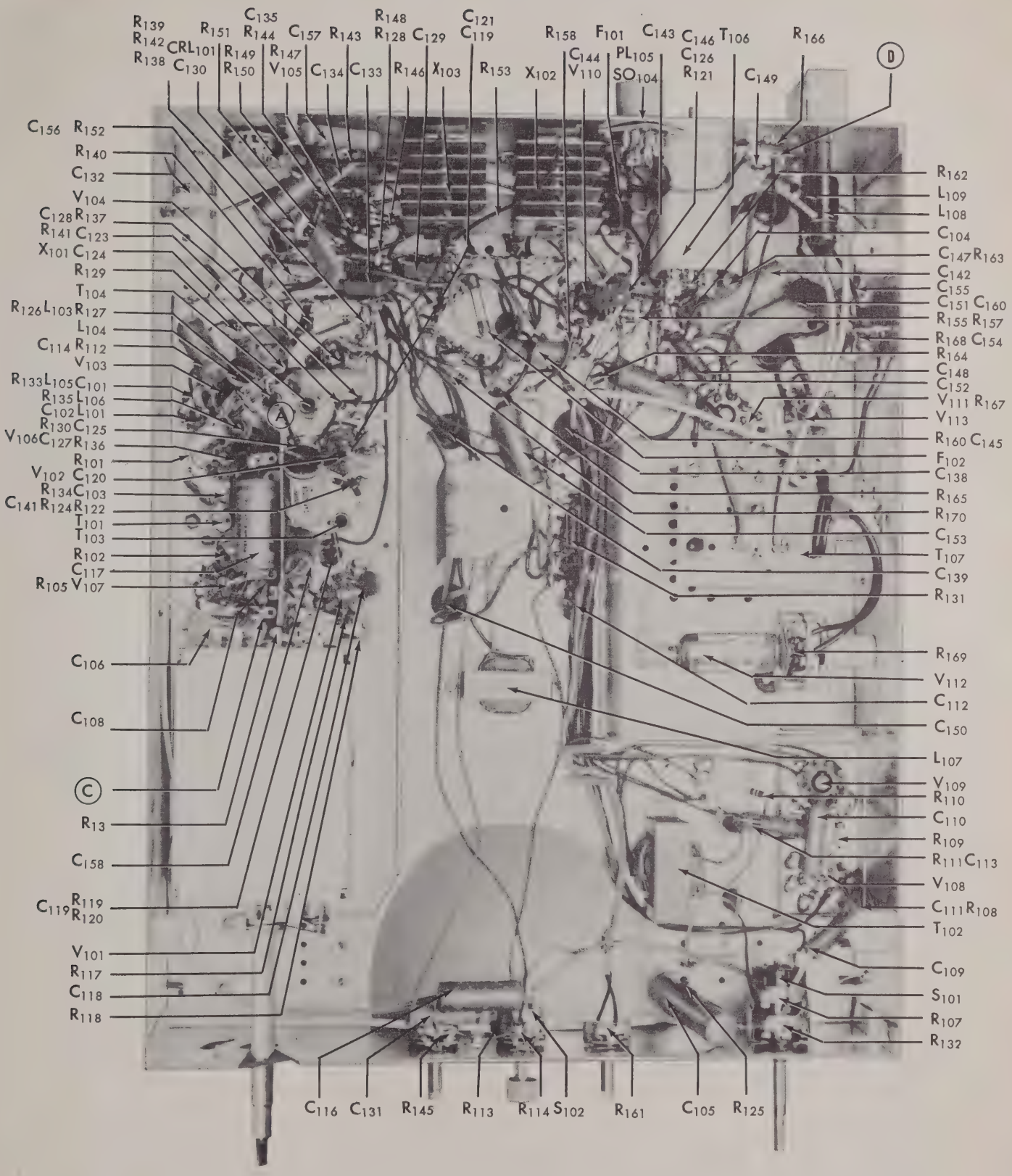


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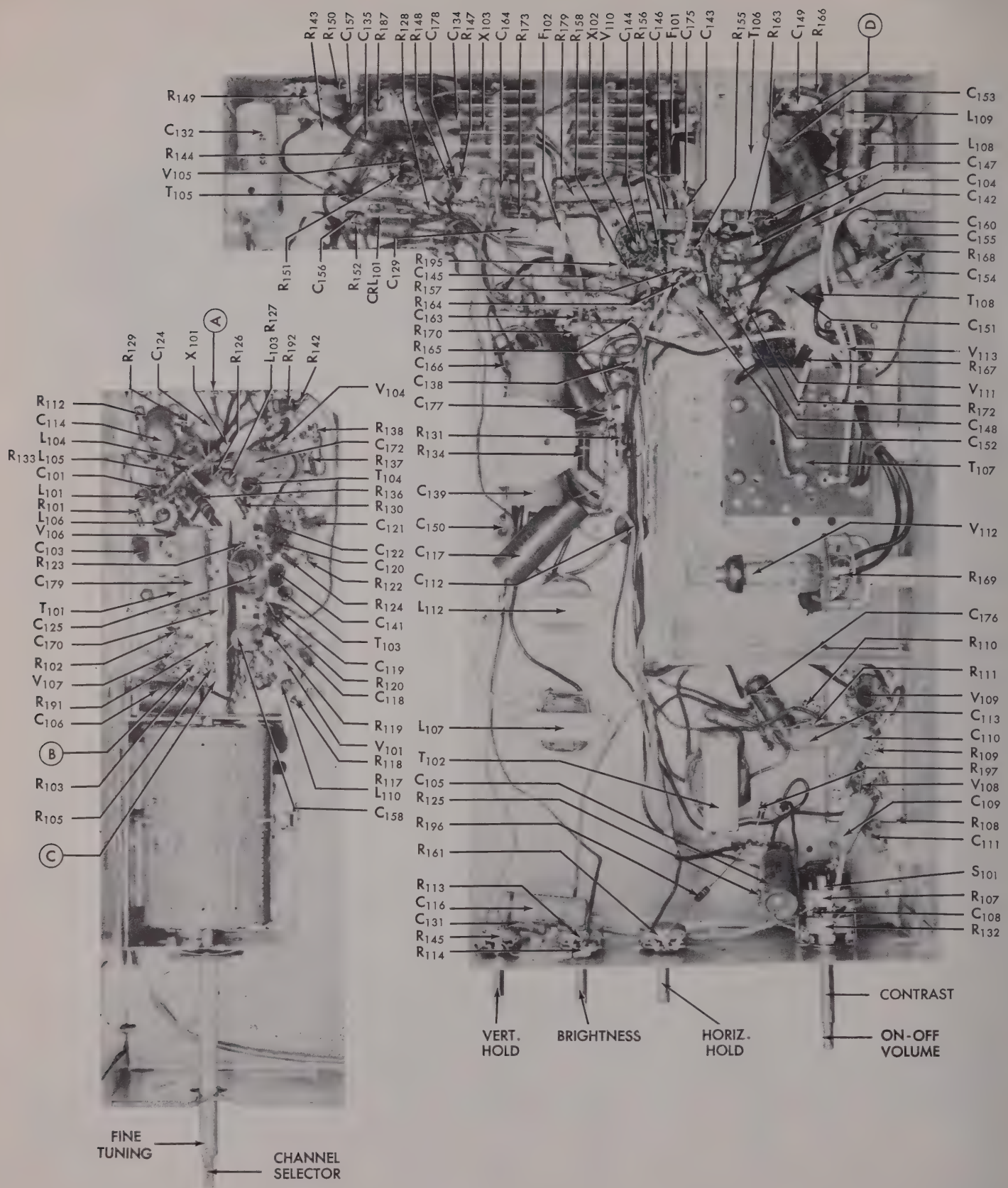
Fig. 28. Bottom View, Component Location for Model 17810C



92X1514

Fig. 29. Bottom View, Component Location for Models 17810M and 17810MG

This illustration is for chassis with EM-PM focus. Model 17810MG also has a phono switch mounted on the rear of the brightness control and a phono jack located on the rear apron of the chassis. The 17810MG uses a 1D1024 tuner instead of the one shown. For an illustration of the 1D1024 tuner and the phono switch see Fig. 30.

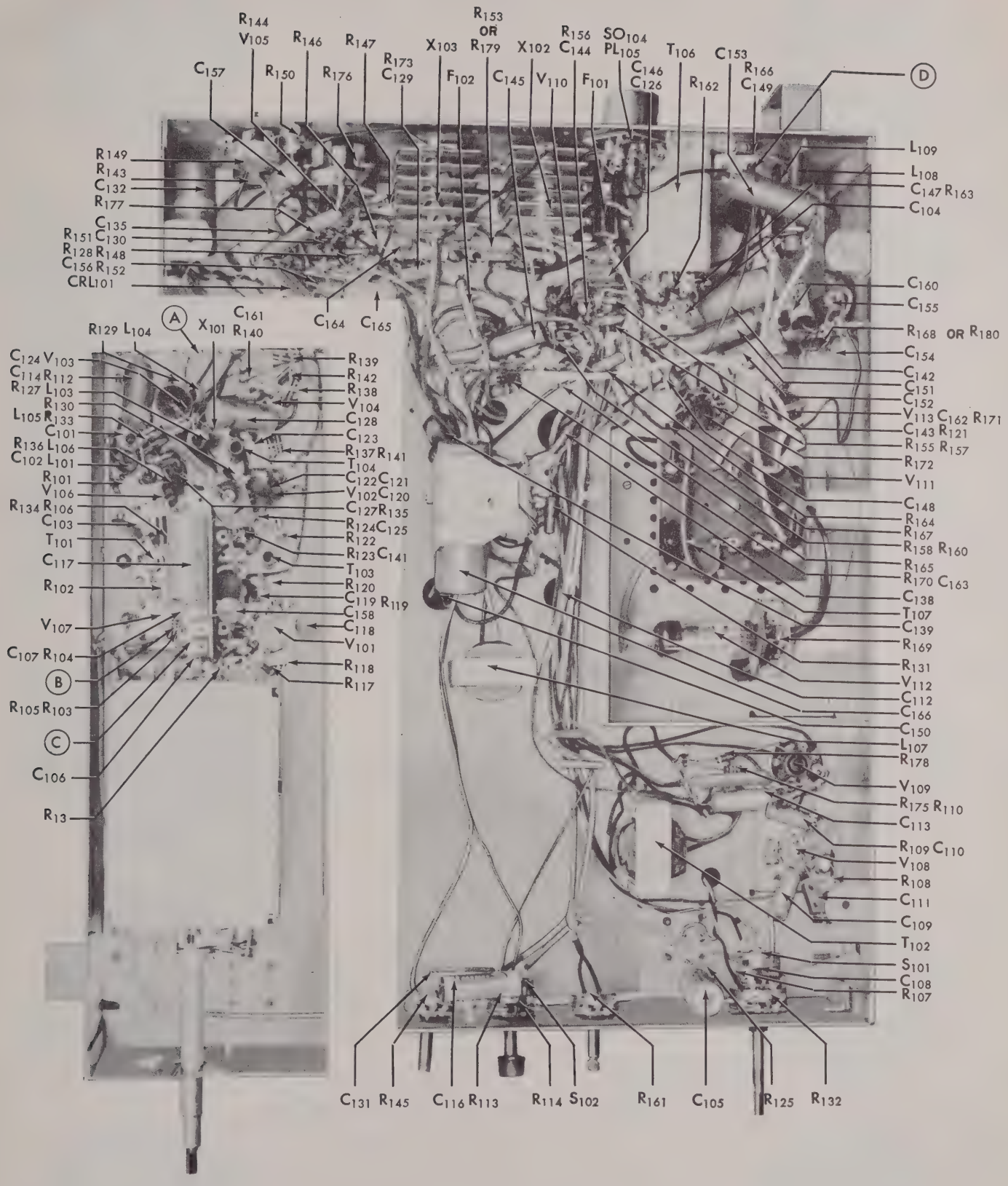


Fig. 30. Bottom View, Component Location for Model 20872

92X1447

The color plug PL-105 and color socket SO-104 shown in the above illustration may not be found on all chassis.

TYPICAL OSCILLOSCOPE PATTERNS

The patterns given on the following pages are presented as a guide when using an oscilloscope to locate trouble in the video amplifier, sync., horizontal oscillator, horizontal output, vertical oscillator, and vertical output stages of the TV receiver.

Considerable variation may be noted in the amplitude and shape of some of the waveforms when comparisons are made between receivers. As long as the waveform obtained from the receiver under test contains the same general characteristics as those shown in the illustrations and the relative amplitude is within approximately 25% of the peak to peak voltage or relative amplitude shown below each waveform, the pattern obtained may be assumed to be correct. The patterns are observed with the TV receiver tuned to an active channel and the controls adjusted for the best possible picture.

The waveforms shown in the illustrations were obtained on a Dumont type 304 oscilloscope which was used in conjunction with a low capacity 10 to 1 probe such as the Tel-Instrument Co. type 1610. Other types of oscilloscopes will account for a certain amount of variation in the amplitude and shape of the patterns obtained from the actual receiver under test. A low capacity probe must be used in order to obtain satisfactory results.

All patterns are taken with the ground side of the oscilloscope connected to the chassis of the TV receiver and the 10 to 1 probe connected to the specific points in the TV chassis as specified by each pattern.

The patterns obtained from the horizontal amplifier plate, damper cathode, horizontal output transformer, and the high voltage rectifier tube must be observed by means of the shielded high voltage probe shown in Fig. 31. The 1X2A tube is used only as a high voltage coupling capacitor. However, the tube must be in good condition as any piece of metal such as a broken filament could cause an internal short and damage the 10 to 1 probe or the oscilloscope. A tube with low emission can be used. The patterns are also shown with their relative amplitudes indicated with respect to the pattern obtained at the plate (pin 5) of the damper tube V-113 which is given a unit value of one.

The shield shown in the special high voltage probe in Fig. 31 is required to prevent spurious pick-up from the field surrounding the horizontal output transformer.

At certain points throughout the TV receiver the oscilloscope pattern obtained will be dependent upon the frequency of the horizontal sweep oscillator in the oscilloscope. The oscilloscope sweep frequency must be either 30 cps ($\frac{1}{2}$ of the TV vertical oscillator frequency) or 7875 cps ($\frac{1}{2}$ of the TV horizontal oscillator frequency) depending upon the pattern desired. The sweep frequency required to obtain the patterns shown is given with each pattern.

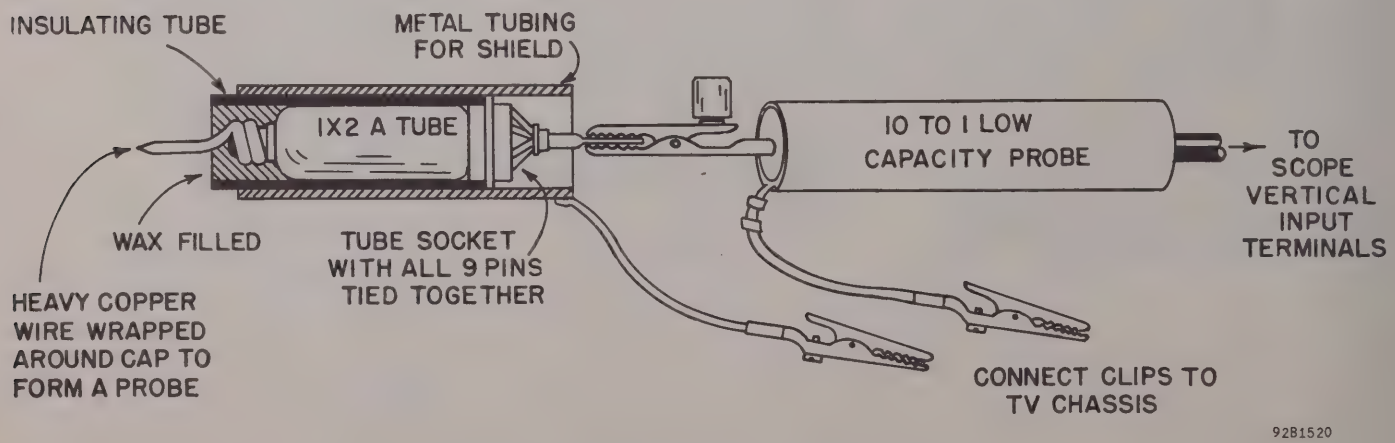


Fig. 31. High Voltage Probe for Waveform Observations

92C1517
1

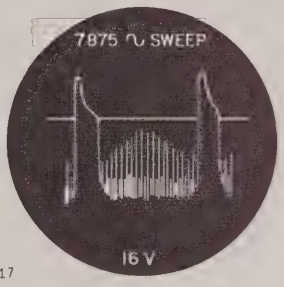
Junction of L-105, L-106 & C-114 or V-103 Video Amp. Plate (Pin 5) or Picture Tube Cathode (Pin 11)

Set the contrast control to give a 40 volt peak to peak reading. Leave the control at this setting when viewing the balance of the waveforms.

92C1517
6

92C1517
2

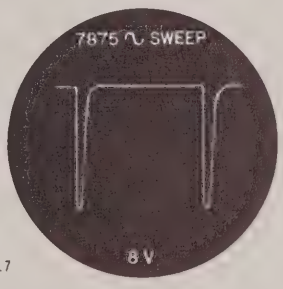
V-104 Sync. Amp. Grid (Pin 2)



92C1517
7

92C1517
3

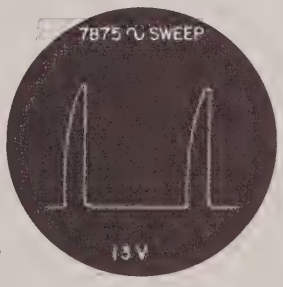
V-104 Sync. Amp. Plate (Pin 1)
or
V-104 Sync. Sep. Grid (Pin 7)



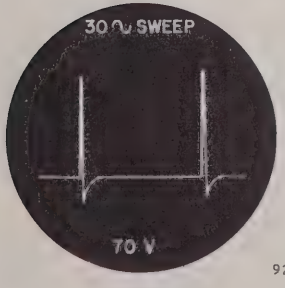
92C1517
8

92C1517
4

V-104 Sync. Sep. Plate (Pin 6)



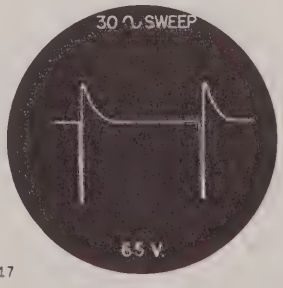
92C1517
9



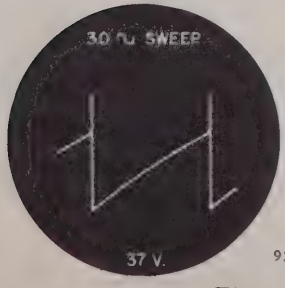
92C1517
10

Vertical Integrating Network CRL-101 (Terminal 2)

V-114 Picture Tube Grid (Pin 2)



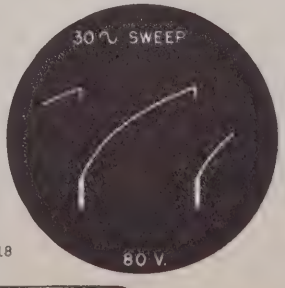
92C1517
5



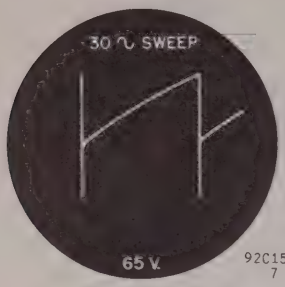
92C1518
6

V-105 Vert. Osc. Grid (Pin 2)

V-105 Vert. Osc. Plate (Pin 1)



92C1518
1

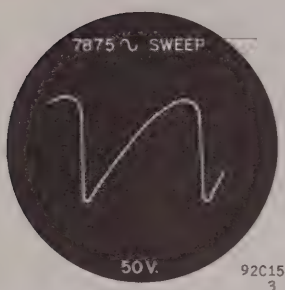


92C1518
7

V-105 Vert. Amp.
Grid (Pin 7)

V-105 Vert. Amp.
Plate (Pin 6)

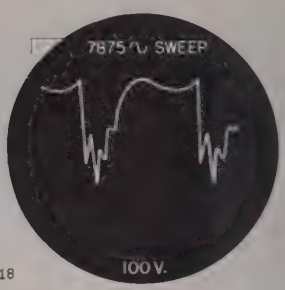
92C1518
2



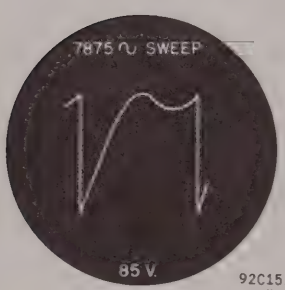
92C1518
3

V-110 Horiz. Osc.
Plate (Pin 5)

V-110 Horiz. Osc.
Plate (Pin 2)



92C1518
8

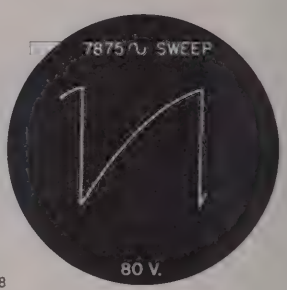


92C1518
4

T-106 Horiz. Osc.
Transformer.
Terminal "C"

Horiz. Osc. Transformer
Terminal "D"

V-111 Horiz. Out. Amp.
Grid (Pin 1)



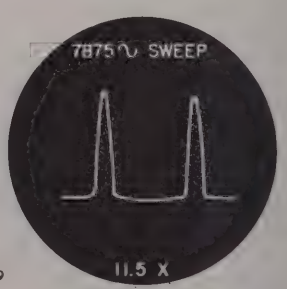
92C1518
9

NOTE: Before endeavoring to view the following waveforms read the notes and and instructions at the beginning of this section pertaining to waveform analysis. The high voltage probe shown in Fig. 31 must be used.

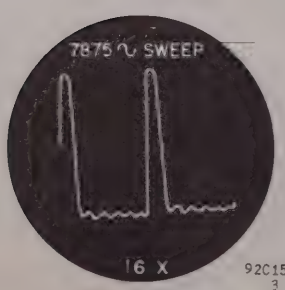
92C1519
1

V-113 Damper
Plate (Pin 5)

V-113 Damper
Cathode (Pin 3)



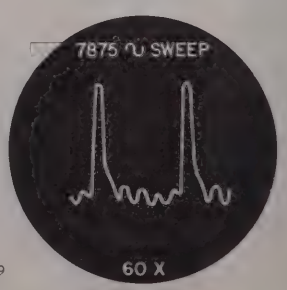
92C1519
2



92C1519
3

Horiz. Output
Amp. Plate (Pin 5)

High Voltage Rectifier
Plate (Cap)



92C1519
4

SERVICE PARTS LIST

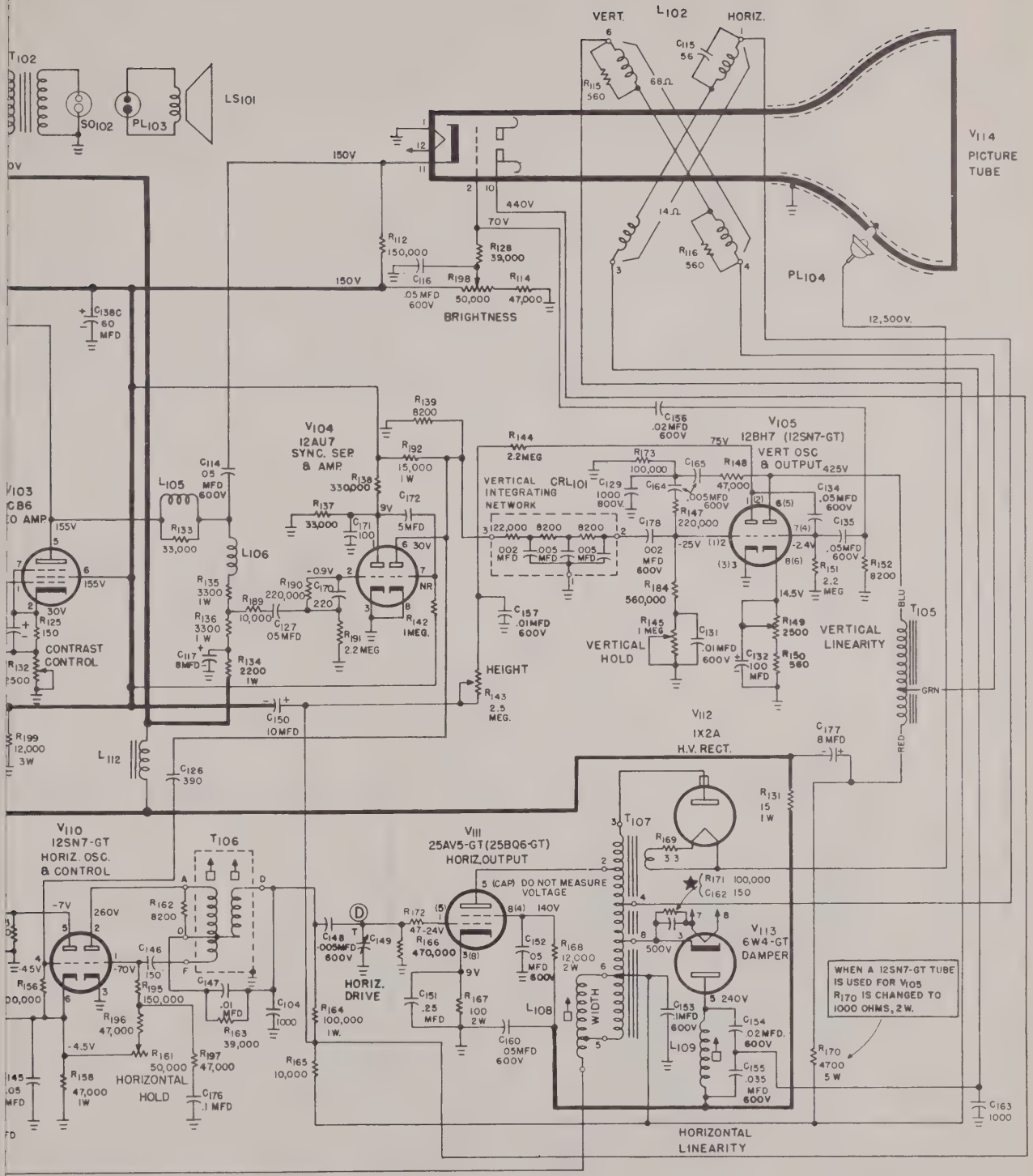
Schematic Symbol	Description	Hallicrafters Part Number
	CABINET PARTS	
	Antenna, Silver Vortex built-in	57D147 or 57D148
	Cabinet (model 17810C)	78F596
	Cabinet (models 17810M, 17810MG)	78F667
	Cabinet (model 20872)	78F560
	Cabinet back (model 17810C)	8E1258
	Cabinet back (models 17810M, 17810MG)	8E1464
	Cabinet back (model 20872)	8E1386
	Escutcheon assembly, front controls (models 17810C, 17810MG, & 20872)	7B230
	Escutcheon assembly, front controls (model 17810M)	7B274
	Escutcheon mask, picture tube (model 17810C)	7D217
	Escutcheon mask, picture tube (models 17810M, 17810MG)	7D253
	Escutcheon mask, picture tube (model 20872)	7D251
	Escutcheon, picture tube (models 17810C, 17810M & 17810MG)	7D196
	Escutcheon, picture tube (model 20872)	7D250
	Glass, safety (models 17810C, 17810M & 17810MG)	22D292
	Glass, safety (model 20872)	22D317
	Knob, BAND SELECTOR (models 17810C, 17810MG & 20872)	15D302
	Knob, CHANNEL INDICATOR (models 17810C, 17810MG & 20872)	15C301
	Knob, CHANNEL SELECTOR (model 17810M)	15D293
	Knob, CHANNEL TUNING (models 17810C, 17810MG & 20872)	15D364
	Knob, CONTRAST (models 17810C, 17810MG & 20872)	15A281
	Knob, CONTRAST (model 17810M)	15D265
	Knob, FINE TUNING (model 17810M)	15A299
	Knob, OFF/ON-VOLUME (models 17810C, 17810MG & 20872)	15C362
	Knob, OFF/ON-VOLUME (model 17810M)	15C297
	Knob, PHONO/BRIGHTNESS (models 17810C, 17810MG & 20872)	15A284
PL-101	Line cord and plugs	87A1668
PL-102	Plug, safety interlock connector (part of PL-101)	-------
PL-103	Plug, speaker	10A372
	Shield, picture tube socket; mtd. on cabinet back (model 17810C)	69C358
	Shield, picture tube socket; mtd. on cabinet back (models 17810M, 17810MG)	69A367
	Shield, picture tube socket; mtd. on cabinet back (model 20872)	69A365
LS-101	Speaker, 5 inch PM (models 17810C, 17810M & 17810MG)	85C103
LS-101	Speaker, 10 inch PM (model 20872)	85C106
	CAPACITORS	
CRL-101	Vertical integrating network	49B015
C-101	2.2 mmf. 500 V., ceramic	47A160-4
C-102	47 mmf. 500 V., ceramic (part of L-101)	--------
C-103A & B	Dual 4000 mmf., ceramic disc	47A218
C-104	1000 mmf. 10%, 500 V., mica	47X20B102K
C-105	100 mfd. 10 V., electrolytic	45B170 or 45B185
C-106	5 mfd. 50 V., electrolytic	45B175
C-107	330 mmf. 10% 500 V., ceramic	47B20331K5
C-108,144,175	1000 mmf. 500 V., ceramic	47B20A102M5
C-109	.01 mfd. 200 V., tubular paper	46AU103J
C-110,113,131, 157,179	.01 mfd. 600 V., tubular paper	46AY103J
C-111,170	220 mmf. 500 V., mica or ceramic	47X20B221K or 47B20A221K5
C-112	60 mfd. 150 V., electrolytic	45B180
C-114,116,127, 134,135,152, 158,160	.05 mfd. 600 V., tubular paper	46AY503J
C-115	56 mmf. 500 V., mica (part of L-102)	---------
C-117	8 mfd. 350 V., electrolytic	45B184
C-118,119,120, 121,122,141	5000 mmf. ceramic disc.	47A168
C-123	5 mmf. 500 V., ceramic	47B20050K5
C-124,125,172	.5 mfd. 25 V., tubular paper	46A177
C-126	390 mmf. 500 V., ceramic	47B20A391M5
*C-129	1000 mmf. 800 V., mica	47-227
C-132	100 mfd. 50 V., electrolytic	45A105
*C-136,137	.01 mfd. 600 V., molded tubular	46BR103L6
*C-138A,B, & C	Triple 60 mfd. 300 V., electrolytic	45B179 or 45B186
*C-139,166	80 mfd. 150 V., electrolytic for EM and EM-PM Focus	45B178
	80 mfd. 150 V., electrolytic for PM focus	45B187
C-142	.5 mfd. 200 V., tubular paper	46AT504J
C-143,148	.005 mfd. 600 V., tubular paper	46AY502J
C-145	.05 mfd. 200 V., tubular paper	46AU503J
C-146,162	150 mmf. 500 V., mica	47X20B151K
*C-147	.01 mfd. 400 V., molded tubular or ceramic	46BR103E4 or 47A224
C-149	Trimmer, HORIZONTAL DRIVE control	44A361
C-150	Dual 10 mfd. 450 V., electrolytic (only 1 section used)	45B182
C-151	.25 mfd. 200 V., tubular paper	46AT254J
C-153	.1 mfd. 600 V., tubular paper	46AY104J
C-154,156	.02 mfd. 600 V., tubular paper	46AY203J
C-155	.035 mfd. 600 V., tubular paper	46AY353J
C-163	1000 mmf. 500 V., ceramic	47B20A102N5
C-164,165	.005 mfd. 10% 600 V., tubular paper	46AY502E
C-171	100 mmf. 500 V., mica or ceramic	47X20B101M or 47B20A101M5
C-174	.005 mfd. 400 V., tubular paper	46AW502J
C-176	.1 mfd. 200 V., tubular paper	46AU104J
C-177	8 mfd. 475 V., electrolytic	45A103
C-178	.002 mfd. 600 V., tubular paper	46AZ202E
	COILS AND TRANSFORMERS	
L-101	Coil, 4.5 MC SOUND ADJ.; peaking coil	50B474
L-102	Deflection yoke	53A212 or 53C218
L-103	Coil, video peaking (wound or R-127)	51A1257
L-104	Coil, video peaking	51A1286
L-105	Coil, video peaking (wound on R-133)	51A1285
L-106	Coil, video peaking	51A1284
L-107,112	Choke, filter	56B116
L-108	Coil, WIDTH control	51B1438
L-109	Coil, HORIZONTAL LINEARITY	51B1335
L-110	Choke, r-f (wound on R-117)	53A219
L-111	Coil, FOCUS; EM-PM	51B1337
L-111	Coil, FOCUS; EM	51-1338
T-101	Transformer, ratio detector	50B473
T-102	Transformer, audio output	55A157
T-103	Transformer, 2nd i-f amplifier	51A1288
T-104	Transformer, 3rd i-f amplifier	51A1289
T-105	Transformer, vertical output	55A166 or 55B128
T-106	Transformer, horizontal oscillator	51B1242
T-107	Transformer, horizontal output	for 25AV5GT 55C156 for 25BQ6GT 55C171
T-108	Transformer, power	52C212
	RESISTORS	
R-13	4700 ohms 1/2 watt, carbon	23X20X472K
R-101,124	150 ohms 1/2 watt, carbon	23X20X151K
R-102	270 ohms 1/2 watt, carbon	23X20X271K
*R-103,104	10,000 ohms 1/2 watt, carbon	23X20X103J
R-105,137	33,000 ohms 1/2 watt, carbon	23X20X333K
R-106,126,139, 152,162	8200 ohms 1/2 watt, carbon	23X20X822K
R-107,132	1 megohm/2500 ohms: OFF-ON-VOLUME/ CONTRAST control (models 17810C, 17810MG & 20872)	25B913
R-107,132	1 megohm/2500 ohms: OFF-ON-VOLUME / CONTRAST control (model 17810M)	25B902
R-108	6.8 megohms 1/2 watt, carbon	23X20X685M
R-109	390,000 ohms 1/2 watt, carbon	23X20X394K
*R-110	390,000 ohms 1/2 watt, carbon	23X20X394J
*R-111	270,000 ohms 1/2 watt, carbon	23X20X274J
R-112,195	150,000 ohms 1/2 watt, carbon	23X20X154K
R-113	50,000 ohms: BRIGHTNESS control and PHONO switch (models 17810C, 17810MG & 20872)	25A915
R-114	47,000 ohms 1/2 watt, carbon	23X20X473M
R-115,116,	560 ohms 1/2 watt, carbon (part of L-102)	----------
R-117	82,000 ohms 1/2 watt, carbon (part of L-110)	---- ------
R-118	47 ohms 1/2 watt, carbon	23X20X470K
R-119,120,123	100 ohms 1/2 watt, carbon	23X20X101K
R-122,165,189	10,000 ohms 1/2 watt, carbon	23X20X103K
R-125	150 ohms 1/2 watt, carbon	23X20X151M
R-127	15,000 ohms 1/2 watt, carbon (part of L-103)	----------
R-128	39,000 ohms 1/2 watt, carbon	23X20X393M
R-129,190	220,000 ohms 1/2 watt, carbon	23X20X224K
R-130,142	1 megohm 1/2 watt, carbon	23X20X105M
R-131	15 ohms 1 watt, carbon	23X30X150M
R-133	33,000 ohms 1/2 watt, carbon (part of L-105	----------
R-134	2200 ohms 1 watt, carbon	23X30X222M
R-135,136	3300 ohms 1 watt, carbon	23X30X332K

* Use exact replacement part only.

SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	RESISTORS (Cont.)	
R-138	330,000 ohms 1/2 watt, carbon	23X20X334K
R-143	2.5 megohms: HEIGHT control	25B711
R-144,151,191	2.2 megohms 1/2 watt, carbon	23X20X225M
R-145	1 megohm: VERTICAL HOLD control	25A900
R-147	220,000 ohms 1/2 watt, carbon	23X20X224M
R-148,196,197	47,000 ohms 1/2 watt, carbon	23X20X473K
R-149	2500 ohms: VERTICAL LINEARITY control	25B899
R-150	560 ohms 1/2 watt, carbon	23X20X561K
R-153	20 ohms 10 watts, WW	24A927
R-155,163	39,000 ohms 1/2 watt, carbon	23X20X393K
R-156,173	100,000 ohms 1/2 watt, carbon	23X20X104K
R-157	8200 ohms 1/2 watt, carbon	23X20X822M
R-158	47,000 ohms 1 watt, carbon	23X30X473K
R-161	50,000 ohms: HORIZONTAL HOLD control	25A901
R-164	100,000 ohms 1 watt, carbon	23X30X104K
R-166	470,000 ohms 1/2 watt, carbon	23X20X474M
R-167	100 ohms 2 watts, carbon	23X40X101K
R-168	12,000 ohms 2 watts, carbon	23X40X123K
R-169	3.3 ohms 1/2 watt, carbon	23X20X033K
R-170	4700 ohms 5 watts, WW or 1000 ohms 2 watts, carbon (See schematic note)	24BF472E or 23X40X102K
R-171	100,000 ohms 1/2 watt, carbon	23X20X104M
R-172	47 ohms 1/2 watt, carbon	23X20X470M
R-179	5 ohms 10 watts, WW	24A923
R-184	560,000 ohms 1/2 watt, carbon	23X20X564K
*R-185,186	7500 ohms 10 watts, WW	24BG752D
R-187	2500 ohms: FOCUS control	25B708 or 25-934
R-188	10,000 ohms 2 watts, carbon or WW	23X40X103K or 24BV103E
R-192	15,000 ohms 1 watt, carbon	23X30X153K
R-193,194,	12,000 ohms 1/2 watt, carbon	23X20X123K
R-198	50,000 ohms: BRIGHTNESS control (model 17810M)	25A901
R-199	12,000 ohms 3 watts, WW	24A931
	TUBES AND RECTIFIERS	
V-1	6AG5, 6BC5 or 6CB6; r-f amplifier (part of TV tuner)	----------
V-2	6J6: oscillator/mixer (part of TV tuner)	----------
V-101,102,103	6CB6: 1st and 2nd. i-f amp. and video amp.	90X6CB6
V-104	12AU7: sync. separator and amplifier	90X12AU7
V-105	12BH7: vert. osc. and output or 12SN7GT: same as above	90X12BH7 or 90X12SN7GT
V-106	6AU6: audio i-f amp.	90X6AU6
V-107	6AL5: FM detector	90X6AL5
V-108	6AV6: audio amplifier or 6SQ7: same as above	90X6AV6 or 90X6SQ7
V-109	25L6GT: audio output	90X25L6GT
V-110	12SN7GT: hor. osc. and control	90X12SN7GT
V-111	25AV5GT: horizontal output or 25BQ6GT: same as above	90X25AV5GT or 90X25BQ6GT
V-112	1X2A: high voltage rectifier	90X1X2A
V-113	6W4GT: damper	90X6W4GT
V-114	16RP4 or 16TP4 or 16UP4: picture tube (model 17810C)	90X16RP4 or 90X16TP4 or 90X16UP4
V-114	17BP4A: picture tube (models 17810M, 17810MG)	90X17BP4A
V-114	19AP4A: picture tube (model 20872)	90X19AP4A
X-101	1N60: crystal diode	19B1246
X-102,103	Selenium rectifier, 300 ma.	27A155
	MISCELLANEOUS	
	Bearing, fiber; tuner shaft (models 17810C, 17810MG & 20872)	8B1176
	Bearing, fiber; tuner shaft (model 17810M)	8B1141
	Bracket, deflection yoke and focus assembly mtg.; lower (models 17810C, 17810M & 17810MG)	67D1235
	Bracket, deflection yoke and focus assembly mtg.; lower (model 20872)	67D1382
	Bracket, deflection yoke and focus assembly mtg.; upper	67D1348
*	Bracket, deflection yoke mtg. (mounted on 67D1348)	67C1244 or 67B1305
	Bracket, focus assembly support (mounted on 67D1348)	67C1386
	Bracket, EM focus coil mounting (mounted on 67C1386)	67C1537
	Bracket, EM-PM focus coil mounting (mounted on 67C1386)	67C1251
	Bracket, PM focus device mounting (mounted on 67C1386)	63C503 or 63C489
	Bracket, pivot support (mounted on 67C1386)	67C1359
	Bracket, pivot; for centering control lever	67A1360 or 67B1351
	Bracket, mounting; for TS-101 and SO-101	67-1447
	Bracket, picture tube mtg.; front right (model 17810C)	67C1313
	Bracket, picture tube mtg.; front right (models 17810M, 17810MG)	67C1317
	Bracket, picture tube mtg.; front right (model 20872)	67D1362
	Bracket, picture tube mtg.; front left (model 17810C)	67C1312
	Bracket, picture tube mtg.; front left (models 17810M, 17810MG)	67C1316
	Bracket, picture tube mtg.; front left (model 20872)	67D1361
	Channel, rubber; 2 (mounted under picture tube on model 20872)	16A204
	Collar, picture tube mtg. (mounted in front of deflection yoke)	16C202
	Cushion, picture tube mtg.; sponge rubber (models 17810C, 17810M & 17810MG)	16A163
	Focus device assembly; PM (permanent magnet)	21C123 or 21C118
F-101	Fuse, 1/4 amp. 125 V.; slow blow	39A353
F-102	Fuse, 1.5 amp. 250 V.; pigtail leads	39A354
	Fuse holder for F-101	6A053
	Insulating cover, picture tube; polyethylene (model 20872).	8D1059
	Ion trap, 39 to 49 gauss	21A120
	Lever, centering control (model 17810C)	74B338
	Lever, centering control (models 17810M, 17810MG)	74B337
	Lever, centering control (model 20872)	74B354
PL-105	Plug, color adapter; 8 pin (model 17810C)	10A407 or 10A428
PL-104	Plug, picture tube anode (models 17810C, 17810M & 17810MG)	10A377
PL-104	Plug, picture tube anode (part of 8D1059 on model 20872)	-------
SO-101	Socket, ac power	10A286
	Socket, miniature 9 pin; molded mica filled	6A360
	Socket, miniature 9 pin; wafer	6A334
	Socket, miniature 7 pin; wafer	6A340
	Socket, 9 pin; wafer with corona ring	6A361
	Socket, octal; molded (includes SO-104)	6B296
SO-103	Socket, phono input (models 17810C, 17810M & 17810MG)	36A041
	Socket, picture tube	6A386
SO-102	Socket, speaker	10A373
	Spring, picture tube ground (models 17810C, 17810M & 17810MG)	75B177
	Strap, picture tube mounting (model 17810C)	76A628
	Strap, picture tube mounting (models 17810M, 17810MG)	76A629
	Strap, picture tube mounting (model 20872)	76B598
S-101	Switch, OFF-ON (part of R-107)	-------
S-102	Switch, PHONO/BRIGHTNESS (part of R-113)	-------
TS-101	Terminal strip, antenna	88A020 or 88A679
	Tuning unit assembly, complete with tubes (models 17810C, 17810MG & 20872)	1D1024
	Tuning unit assembly, complete with tubes (model 17810M)	1D1049

* Use exact replacement part only.



TIONS MAY BE FOUND.
NT CORRESPOND TO THE

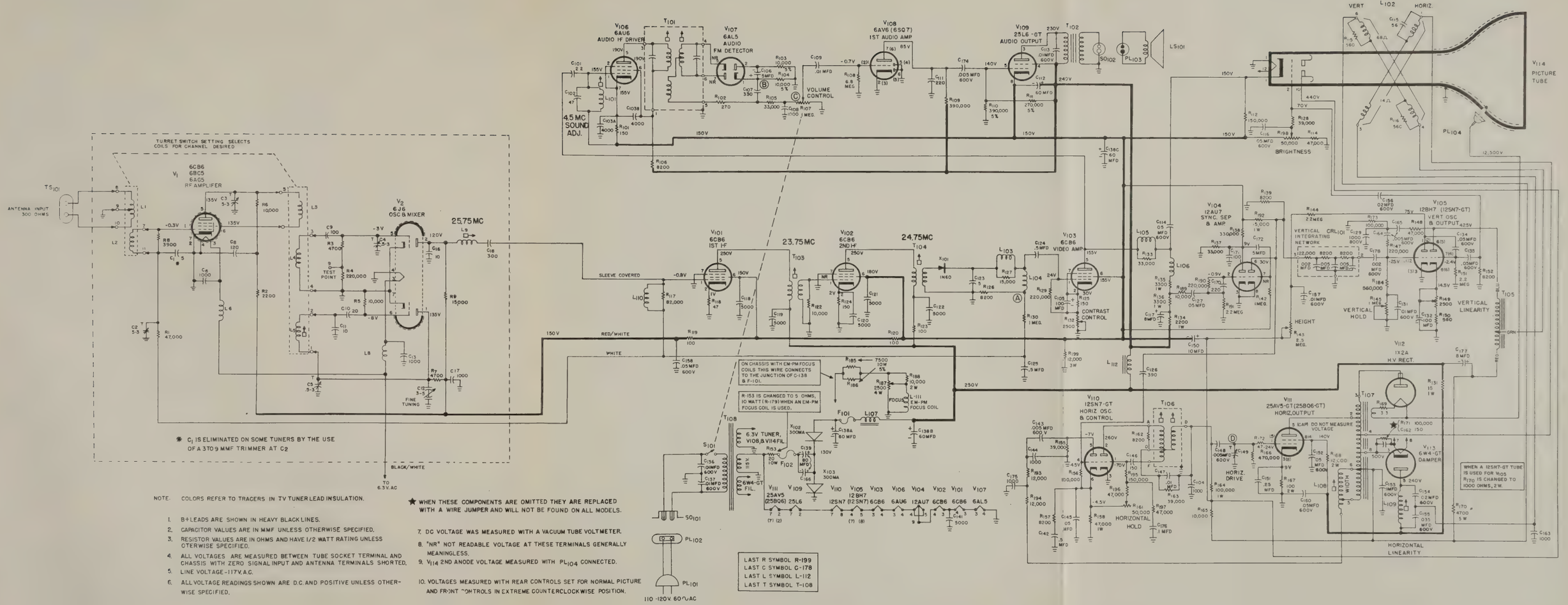
SERVICE PARTS LIST

Schematic Symbol	Description	Hallicrafters Part Number
	RESISTORS (Cont.)	
R-138	330,000 ohms 1/2 watt, carbon	23X20X334K
R-143	2.5 megohms: HEIGHT control	25B711
R-144,151,191	2.2 megohms 1/2 watt, carbon	23X20X225M
R-145	1 megohm: VERTICAL HOLD control	25A900
R-147	220,000 ohms 1/2 watt, carbon	23X20X224M
R-148,196,197	47,000 ohms 1/2 watt, carbon	23X20X473K
R-149	2500 ohms: VERTICAL LINEARITY control	25B899
R-150	560 ohms 1/2 watt, carbon	23X20X561K
R-153	20 ohms 10 watts, WW	24A927
R-155,163	39,000 ohms 1/2 watt, carbon	23X20X393K
R-156,173	100,000 ohms 1/2 watt, carbon	23X20X104K
R-157	8200 ohms 1/2 watt, carbon	23X20X822M
R-158	47,000 ohms 1 watt, carbon	23X30X473K
R-161	50,000 ohms: HORIZONTAL HOLD control	25A901
R-164	100,000 ohms 1 watt, carbon	23X30X104K
R-166	470,000 ohms 1/2 watt, carbon	23X20X474M
R-167	100 ohms 2 watts, carbon	23X40X101K
R-168	12,000 ohms 2 watts, carbon	23X40X123K
R-169	3.3 ohms 1/2 watt, carbon	23X20X033K
R-170	4700 ohms 5 watts, WW or 1000 ohms 2 watts, carbon (See schematic note)	24BF472E or 23X40X102K
R-171	100,000 ohms 1/2 watt, carbon	23X20X104M
R-172	47 ohms 1/2 watt, carbon	23X20X470M
R-179	5 ohms 10 watts, WW	24A923
R-184	560,000 ohms 1/2 watt, carbon	23X20X564K
*R-185,186	7500 ohms 10 watts, WW	24BG752D
R-187	2500 ohms: FOCUS control	25B708 or 25-934
R-188	10,000 ohms 2 watts, carbon or WW	23X40X103K or 24BV103E
R-192	15,000 ohms 1 watt, carbon	23X30X153K
R-193,194,	12,000 ohms 1/2 watt, carbon	23X20X123K
R-198	50,000 ohms: BRIGHTNESS control (model 17810M)	25A901
R-199	12,000 ohms 3 watts, WW	24A931
	TUBES AND RECTIFIERS	
V-1	6AG5, 6BC5 or 6CB6; r-f amplifier (part of TV tuner)	----------
V-2	6J6: oscillator/mixer (part of TV tuner)	----------
V-101,102,103	6CB6: 1st and 2nd. i-f amp. and video amp.	90X6CB6
V-104	12AU7: sync. separator and amplifier	90X12AU7
V-105	12BH7: vert. osc. and output or	90X12BH7
	12SN7GT: same as above	90X12SN7GT
V-106	6AU6: audio i-f amp.	90X6AU6
V-107	6AL5: FM detector	90X6AL5
V-108	6AV6: audio amplifier or	90X6AV6
	6SQ7: same as above	90X6SQ7
V-109	25L6GT: audio output	90X25L6GT
V-110	12SN7GT: hor. osc. and control	90X12SN7GT
V-111	25AV5GT: horizontal output or	90X25AV5GT
	25BQ6GT: same as above	90X25BQ6GT
V-112	1X2A: high voltage rectifier	90X1X2A
V-113	6W4GT: damper	90X6W4GT
V-114	16RP4 or 16TP4 or 16UP4: picture tube (model 17810C)	90X16RP4 or 90X16TP4 or 90X16UP4
V-114	17BP4A: picture tube (models 17810M, 17810MG)	90X17BP4A
V-114	19AP4A: picture tube (model 20872)	90X19AP4A
X-101	1N60: crystal diode	19B1246
X-102,103	Selenium rectifier, 300 ma.	27A155
	MISCELLANEOUS	
	Bearing, fiber; tuner shaft (models 17810C, 17810MG & 20872)	8B1176
	Bearing, fiber; tuner shaft (model 17810M)	8B1141
	Bracket, deflection yoke and focus assembly mtg.; lower (models 17810C, 17810M & 17810MG)	67D1235
	Bracket, deflection yoke and focus assembly mtg.; lower (model 20872)	67D1382
	Bracket, deflection yoke and focus assembly mtg.; upper	67D1348

Schematic Symbol	Description	Hallicrafters Part Number
	MISCELLANEOUS (Cont.)	
*	Bracket, deflection yoke mtg. (mounted on 67D1348)	67C1244 or 67B1305
	Bracket, focus assembly support (mounted on 67D1348)	67C1386
	Bracket, EM focus coil mounting (mounted on 67C1386)	67C1537
	Bracket, EM-PM focus coil mounting (mounted on 67C1386)	67C1251
	Bracket, PM focus device mounting (mounted on 67C1386)	63C503 or 63C489
	Bracket, pivot support (mounted on 67C1386)	67C1359
	Bracket, pivot; for centering control lever	67A1360 or 67B1351
	Bracket, mounting; for TS-101 and SO-101	67-1447
	Bracket, picture tube mtg.; front right (model 17810C)	67C1313
	Bracket, picture tube mtg.; front right (models 17810M, 17810MG)	67C1317
	Bracket, picture tube mtg.; front right (model 20872)	67D1362
	Bracket, picture tube mtg.; front left (model 17810C)	67C1312
	Bracket, picture tube mtg.; front left (models 17810M, 17810MG)	67C1316
	Bracket, picture tube mtg.; front left (model 20872)	67D1361
	Channel, rubber; 2 (mounted under picture tube on model 20872)	16A204
	Collar, picture tube mtg. (mounted in front of deflection yoke)	16C202
	Cushion, picture tube mtg.; sponge rubber (models 17810C, 17810M & 17810MG)	16A163
	Focus device assembly; PM (permanent magnet)	21C123 or 21C121 or 21C118
F-101	Fuse, 1/4 amp. 125 V.; slow blow	39A353
F-102	Fuse, 1.5 amp. 250 V.; pigtail leads	39A354
	Fuse holder for F-101	6A053
	Insulating cover, picture tube; polyethylene (model 20872)	8D1059
	Ion trap, 39 to 49 gauss	21A120
	Lever, centering control (model 17810C)	74B338
	Lever, centering control (models 17810M, 17810MG)	74B337
	Lever, centering control (model 20872)	74B354
PL-105	Plug, color adapter; 8 pin (model 17810C)	10A407 or 10A428
PL-104	Plug, picture tube anode (models 17810C, 17810M & 17810MG)	10A377
PL-104	Plug, picture tube anode (part of 8D1059 on model 20872)	-------
SO-101	Socket, ac power	10A286
	Socket, miniature 9 pin; molded mica filled	6A360
	Socket, miniature 9 pin; wafer	6A334
	Socket, miniature 7 pin; wafer	6A340
	Socket, 9 pin; wafer with corona ring	6A361
	Socket, octal; molded (includes SO-104)	6B296
SO-103	Socket, phono input (models 17810C, 17810M & 17810MG)	36A041
	Socket, picture tube	6A386
SO-102	Socket, speaker	10A373
	Spring, picture tube ground (models 17810C, 17810M & 17810MG)	75B177
	Strap, picture tube mounting (model 17810C)	76A628
	Strap, picture tube mounting (models 17810M, 17810MG)	76A629
	Strap, picture tube mounting (model 20872)	76B598
S-101	Switch, OFF-ON (part of R-107)	-------
S-102	Switch, PHONO/BRIGHTNESS (part of R-113)	-------
TS-101	Terminal strip, antenna	88A020 or 88A679
	Tuning unit assembly, complete with tubes (models 17810C, 17810MG & 20872)	1D1024
	Tuning unit assembly, complete with tubes (model 17810M)	1D1049

* Use exact replacement part only.

MODEL 17810M
RUN 1



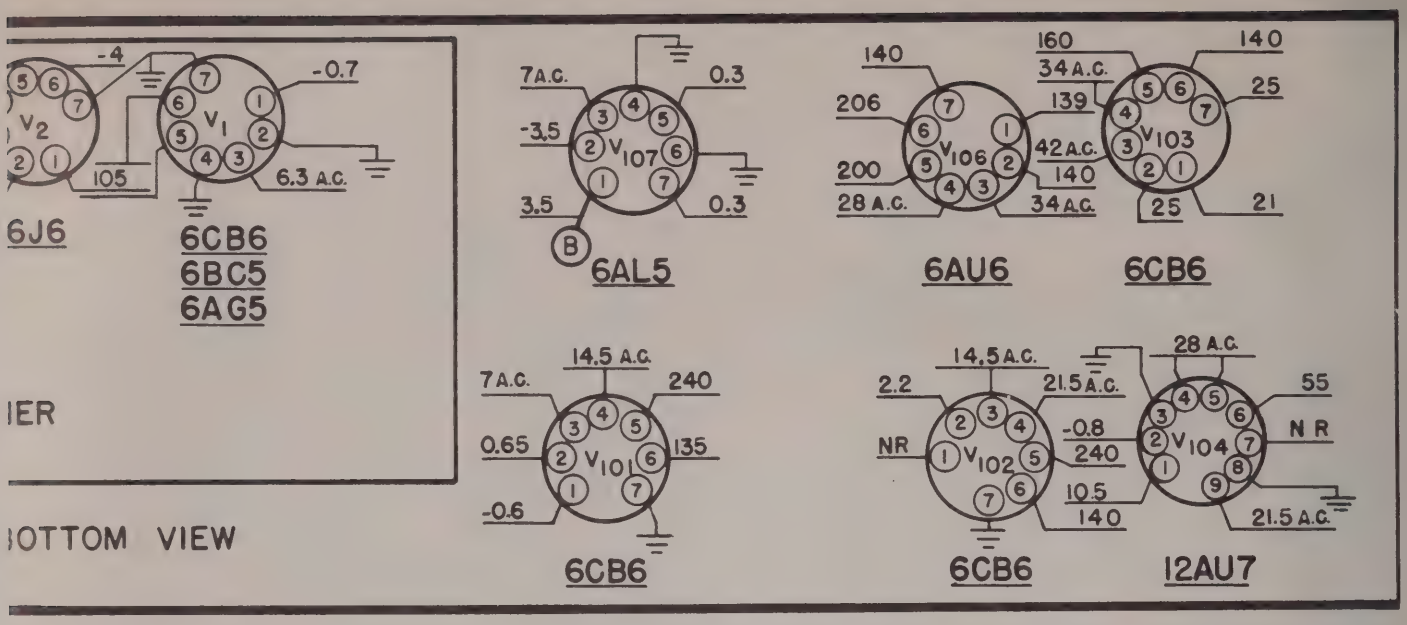
NOTE: COLORS REFER TO TRACERS IN TV TUNER LEAD INSULATION.

1. B+ LEADS ARE SHOWN IN HEAVY BLACK LINES.
2. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
3. RESISTOR VALUES ARE IN OHMS AND HAVE 1/2 WATT RATING UNLESS OTERWISE SPECIFIED.
4. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINAL AND CHASSIS WITH ZERO SIGNAL INPUT AND ANTENNA TERMINALS SHORTED.
5. LINE VOLTAGE -117V. A.C.
6. ALL VOLTAGE READINGS SHOWN ARE D.C. AND POSITIVE UNLESS OTHERWISE SPECIFIED.

★ WHEN THESE COMPONENTS ARE OMITTED THEY ARE REPLACED WITH A WIRE JUMPER AND WILL NOT BE FOUND ON ALL MODELS.

7. DC VOLTAGE WAS MEASURED WITH A VACUUM TUBE VOLTMETER.
8. "NR" NOT READABLE VOLTAGE AT THESE TERMINALS GENERALLY MEANINGLESS.
9. V_{114} 2ND ANODE VOLTAGE MEASURED WITH PL_{104} CONNECTED.
10. VOLTAGES MEASURED WITH REAR CONTROLS SET FOR NORMAL PICTURE AND FRONT CONTROLS IN EXTREME COUNTERCLOCKWISE POSITION.

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.



92B1379

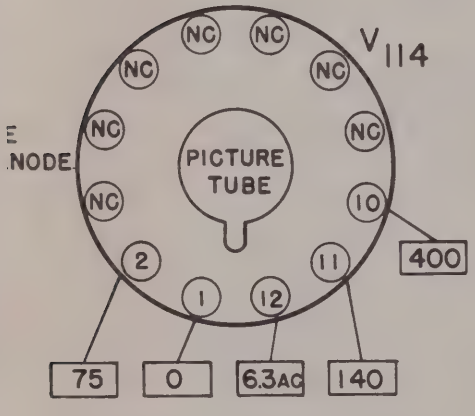


Fig. 33. Voltage Chart for Tuner I-F Assembly and Picture Tube (V-114) with PM Focus Device

/OLTAGES ARE MEASURED BETWEEN THE TUBE SOCKET TERMINAL AND THE CHASSIS WITH ZERO .L INPUT AND THE ANTENNA TERMINALS SHORTED.

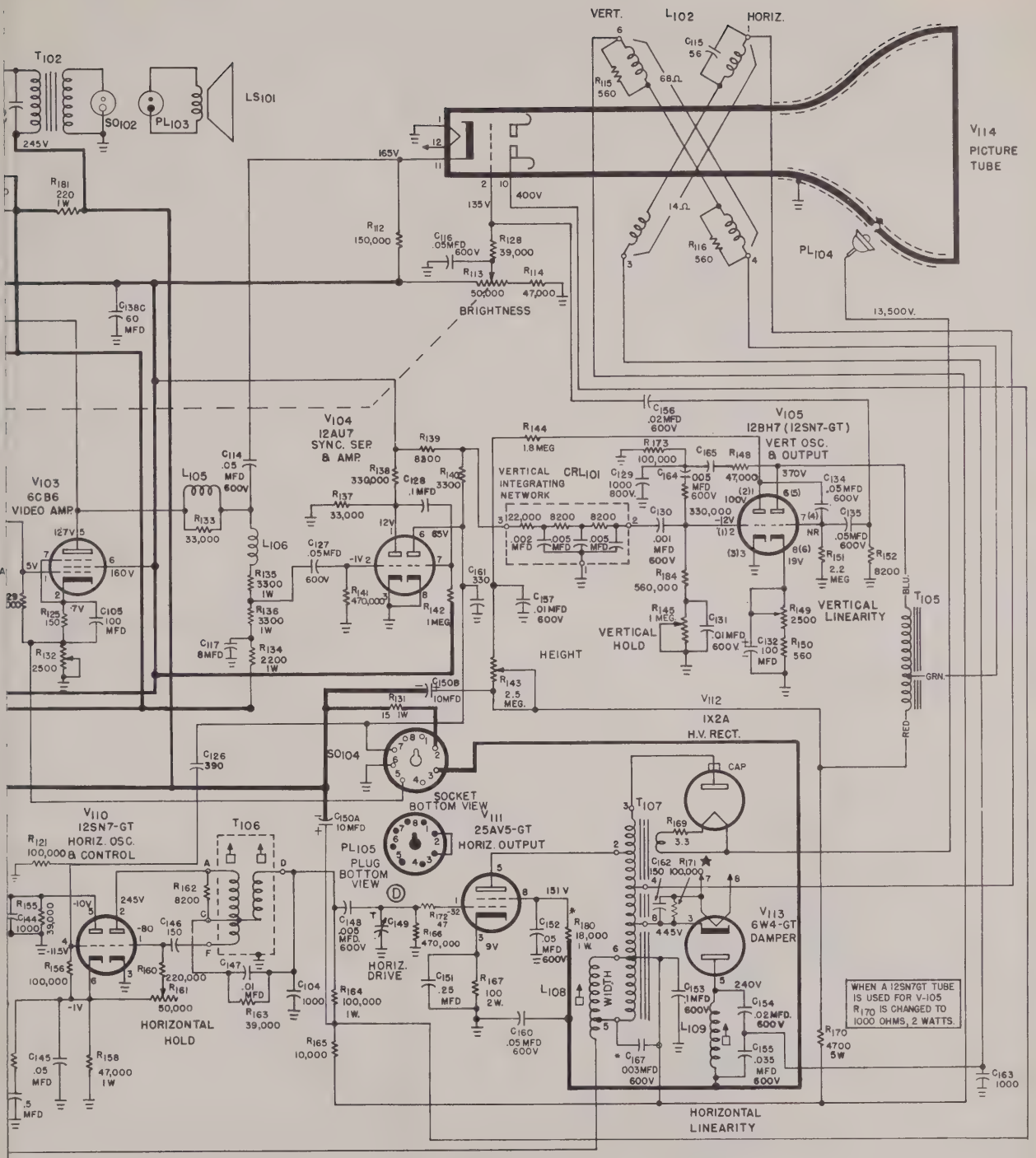
VOLTAGE SET AT 117 VOLTS.

/OLTAGE READINGS SHOWN ARE D.C. AND POSITIVE UNLESS OTHERWISE SPECIFIED.

). C. VOLTAGES ARE MEASURED WITH A VACUUM TUBE VOLTMETER (VTVM).

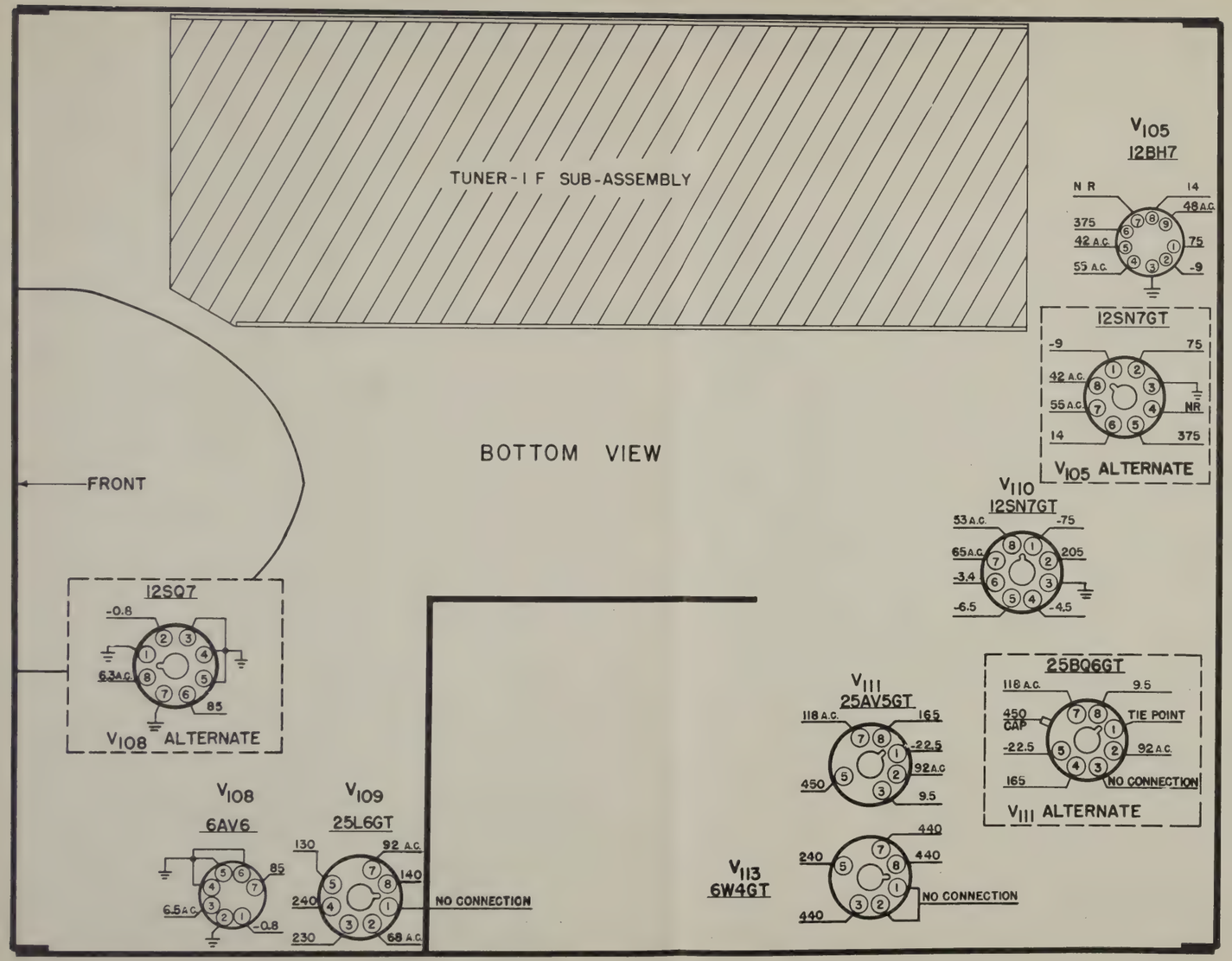
INDICATES THAT THE VOLTAGE IS NOT READABLE. VOLTAGE AT THESE TERMINALS IS USUALLY INGLESS.

AGES ARE MEASURED WITH REAR CONTROLS SET FOR NORMAL PICTURE OPERATION AND FRONT ROLS IN THE EXTREME COUNTERCLOCKWISE POSITION.



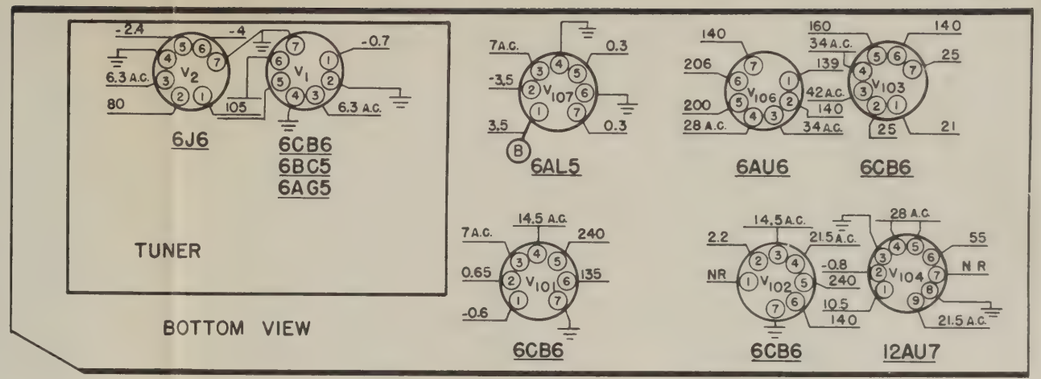
OR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
R VALUES ARE IN OHMS AND HAVE 1/2 WATT RATING UNLESS SE SPECIFIED.
NY FOCUS DEVICE OTHER THAN PART NO. 21C123 IS USED COMES 12,000 OHMS, 2 WATTS AND C_{167} IS DELETED.
C_{162} WILL NOT BE FOUND IN ALL CHASSIS; WHEN OMITTED, 7 OF V_{113} ARE CONNECTED TOGETHER.

89F364-4



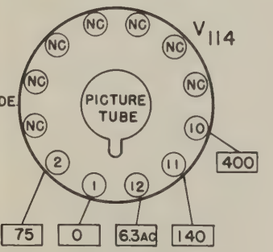
92C1378

Fig. 32. Voltage Chart for Main Chassis with PM Focus Device



92B1379

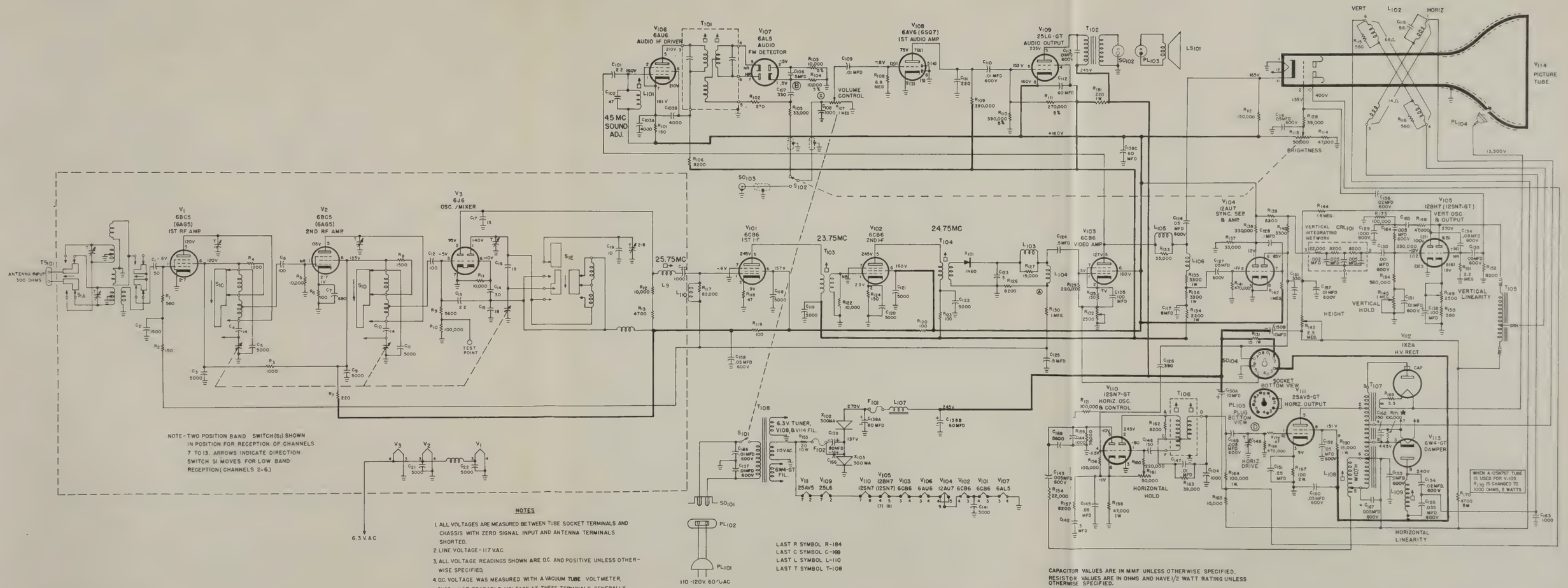
CAUTION —
SEE TEXT BEFORE ATTEMPTING TO MEASURE VOLTAGE ON THE SECOND ANODE.



92A1382

Fig. 33. Voltage Chart for Tuner I-F Assembly and Picture Tube (V-114) with PM Focus Device

1. ALL VOLTAGES ARE MEASURED BETWEEN THE TUBE SOCKET TERMINAL AND THE CHASSIS WITH ZERO SIGNAL INPUT AND THE ANTENNA TERMINALS SHORTED.
2. LINE VOLTAGE SET AT 117 VOLTS.
3. ALL VOLTAGE READINGS SHOWN ARE D.C. AND POSITIVE UNLESS OTHERWISE SPECIFIED.
4. ALL D. C. VOLTAGES ARE MEASURED WITH A VACUUM TUBE VOLTMETER (VTVM).
5. "NR" INDICATES THAT THE VOLTAGE IS NOT READABLE. VOLTAGE AT THESE TERMINALS IS USUALLY MEANINGLESS.
6. VOLTAGES ARE MEASURED WITH REAR CONTROLS SET FOR NORMAL PICTURE OPERATION AND FRONT CONTROLS IN THE EXTREME COUNTERCLOCKWISE POSITION.



NOTE-TWO POSITION BAND SWITCH(S1) SHOWN IN POSITION FOR RECEPTION OF CHANNELS 7 TO 13. ARROWS INDICATE DIRECTION SWITCH S1 MOVES FOR LOW BAND RECEPTION(CHANNELS 2-6.)

NOTES

1. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINALS AND CHASSIS WITH ZERO SIGNAL INPUT AND ANTENNA TERMINALS SHORTED.
2. LINE VOLTAGE-117 V.AC.
3. ALL VOLTAGE READINGS SHOWN ARE D.C. AND POSITIVE UNLESS OTHERWISE SPECIFIED.
4. D.C. VOLTAGE WAS MEASURED WITH A VACUUM TUBE VOLTMETER.
5. "NR"—NOT READABLE, VOLTAGE AT THESE TERMINALS GENERALLY MEANINGLESS.
6. "0"-DESIGNATES TERMINALS WHICH ARE GROUNDED.
7. B+ LEADS ARE SHOWN IN HEAVY BLACK LINES.
8. V114 2ND ANODE VOLTAGE MEASURED WITH PL104 CONNECTED.
9. VOLTAGES MEASURED WITH REAR CONTROLS SET FOR NORMAL PICTURE AND FRONT CONTROLS IN THE EXTREME COUNTERCLOCKWISE POSITION.

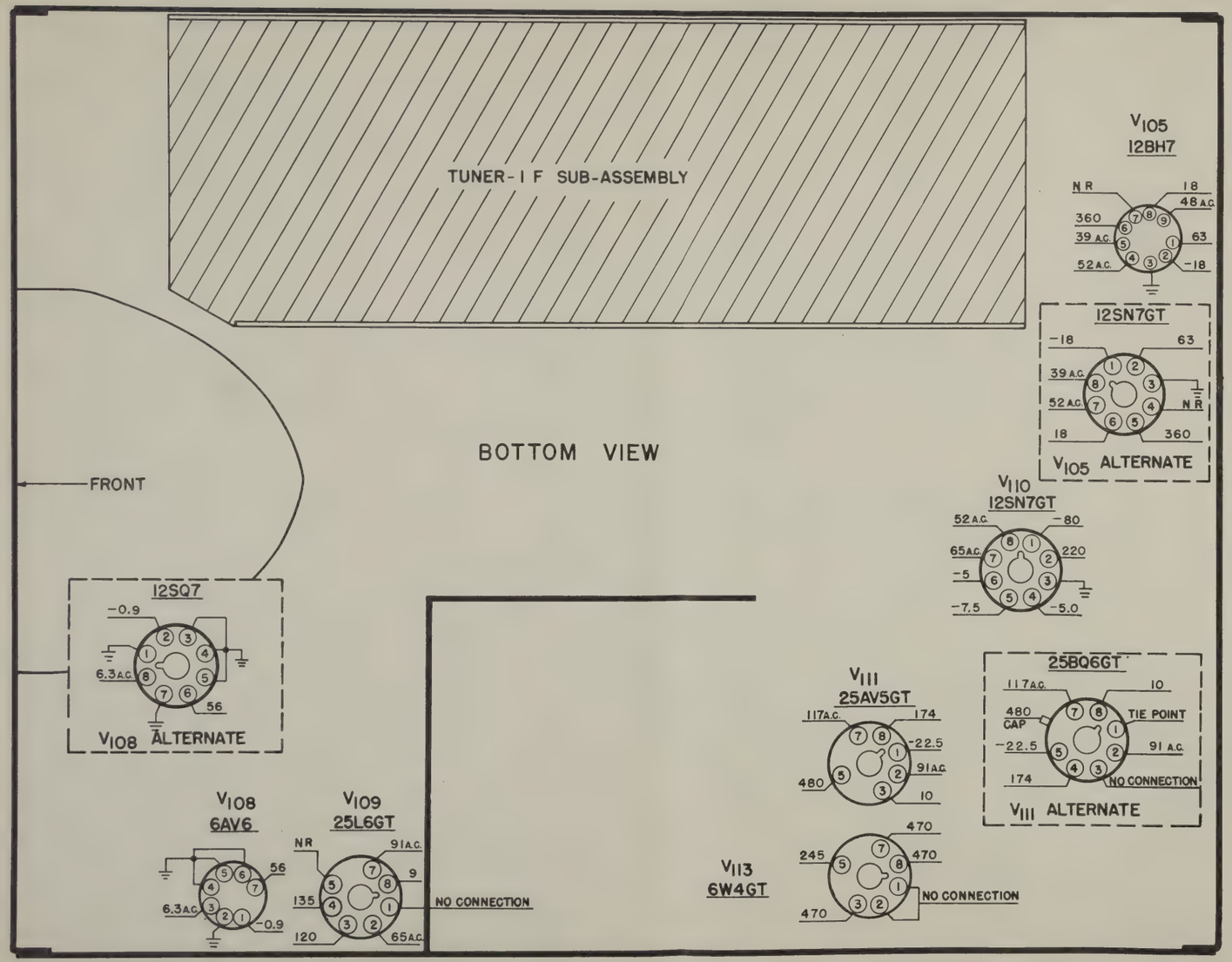
VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
RESISTOR VALUES ARE IN OHMS AND HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.

* WHEN ANY FOCUS DEVICE OTHER THAN PART NO. 21C123 IS USED R181 BECOMES 12,000 OHMS, 2 WATTS AND C167 IS DELETED.

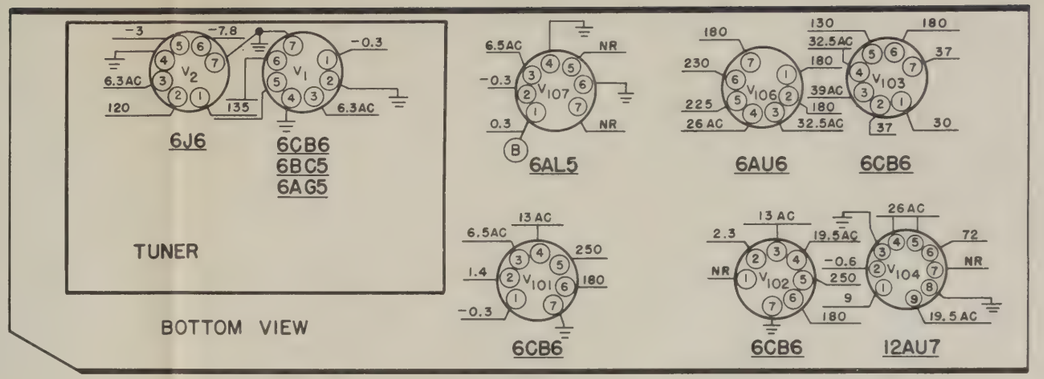
★ R171 & C162 WILL NOT BE FOUND IN ALL CHASSIS; WHEN OMITTED, PINS 3 & 7 OF V113 ARE CONNECTED TOGETHER.

89F364-4

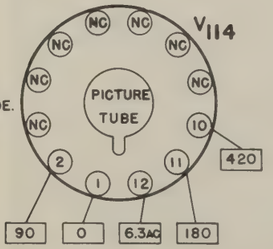


92C1380

Fig. 34. Voltage Chart for Main Chassis with EM-PM Focus Coil



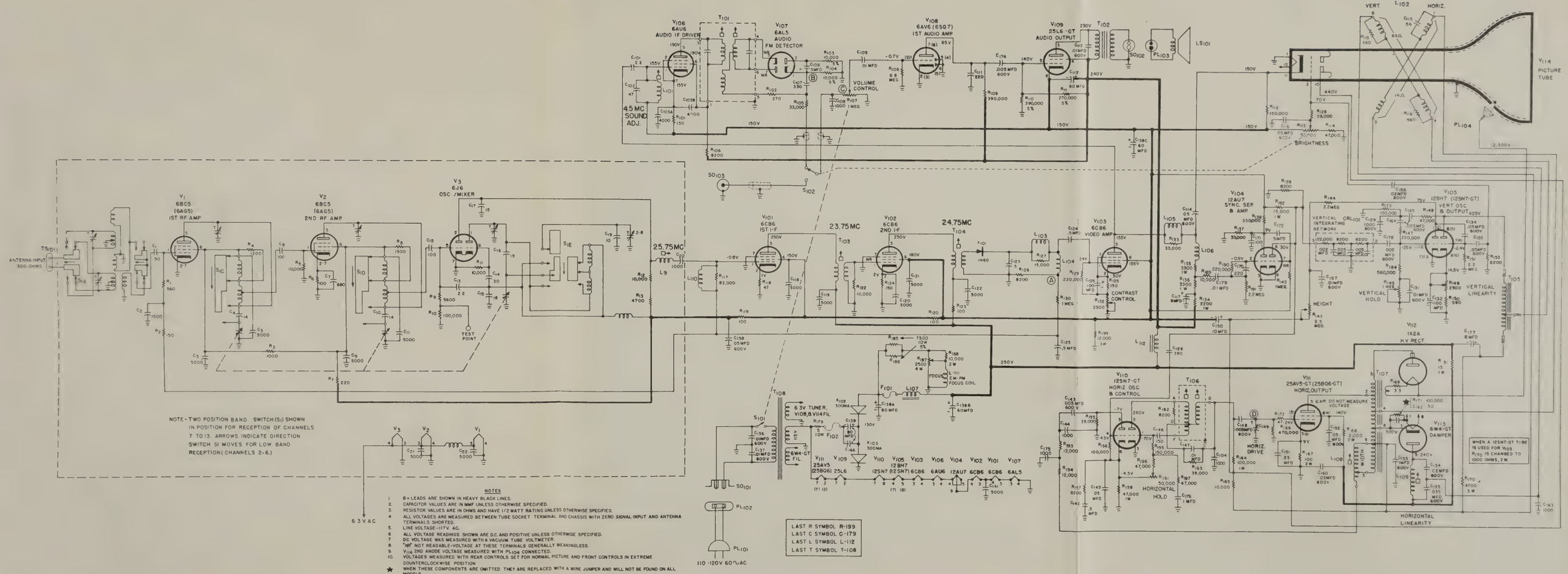
CAUTION —
SEE TEXT BEFORE ATTEMPTING TO MEASURE VOLTAGE ON THE SECOND ANODE.



92A1383

Fig. 35. Voltage Chart for Tuner I-F Assembly and Picture Tube (V-114) with EM-PM Focus Coil

1. ALL VOLTAGES ARE MEASURED BETWEEN THE TUBE SOCKET TERMINAL AND THE CHASSIS WITH ZERO SIGNAL INPUT AND THE ANTENNA TERMINALS SHORTED.
2. LINE VOLTAGE SET AT 117 VOLTS.
3. ALL VOLTAGE READINGS SHOWN ARE D.C. AND POSITIVE UNLESS OTHERWISE SPECIFIED.
4. ALL D.C. VOLTAGES ARE MEASURED WITH A VACUUM TUBE VOLTMETER (VTVM).
5. "NR" INDICATES THAT THE VOLTAGE IS NOT READABLE. VOLTAGE AT THESE TERMINALS IS USUALLY MEANINGLESS.
6. VOLTAGES ARE MEASURED WITH REAR CONTROLS SET FOR NORMAL PICTURE OPERATION AND FRONT CONTROLS IN THE EXTREME COUNTERCLOCKWISE POSITION.



NOTES

1. B+ LEADS ARE SHOWN IN HEAVY BLACK LINES.
2. CAPACITOR VALUES ARE IN MMF UNLESS OTHERWISE SPECIFIED.
3. RESISTOR VALUES ARE IN OHMS AND HAVE 1/2 WATT RATING UNLESS OTHERWISE SPECIFIED.
4. ALL VOLTAGES ARE MEASURED BETWEEN TUBE SOCKET TERMINAL AND CHASSIS WITH ZERO SIGNAL INPUT AND ANTENNA TERMINALS SHORTED.
5. LINE VOLTAGE-117V. AC.
6. ALL VOLTAGE READINGS SHOWN ARE D.C. AND POSITIVE UNLESS OTHERWISE SPECIFIED.
7. DC VOLTAGE WAS MEASURED WITH A VACUUM TUBE VOLTMETER.
8. "NR" NOT READABLE-VOLTAGE AT THESE TERMINALS GENERALLY MEANINGLESS.
9. V_{114} 2ND ANODE VOLTAGE MEASURED WITH PL_{104} CONNECTED.
10. VOLTAGES MEASURED WITH REAR CONTROLS SET FOR NORMAL PICTURE AND FRONT CONTROLS IN EXTREME COUNTERCLOCKWISE POSITION.

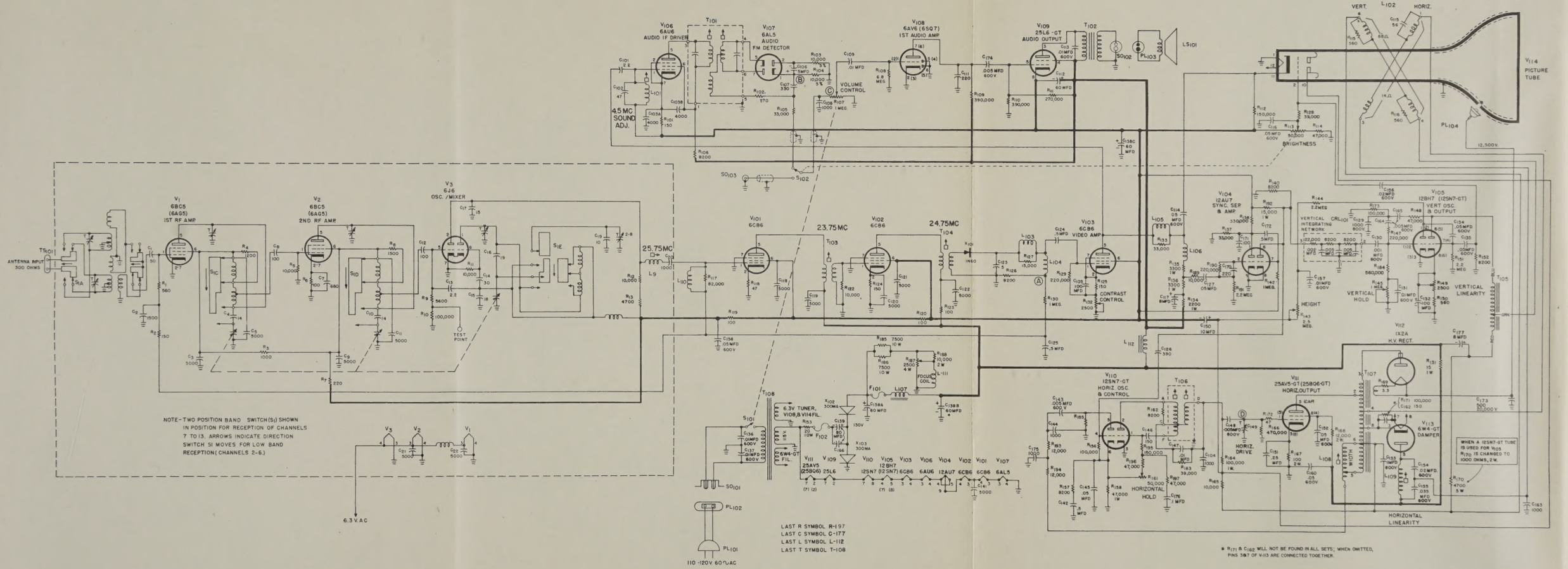
★ WHEN THESE COMPONENTS ARE OMITTED THEY ARE REPLACED WITH A WIRE JUMPER AND WILL NOT BE FOUND ON ALL MODELS.

VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

89F396

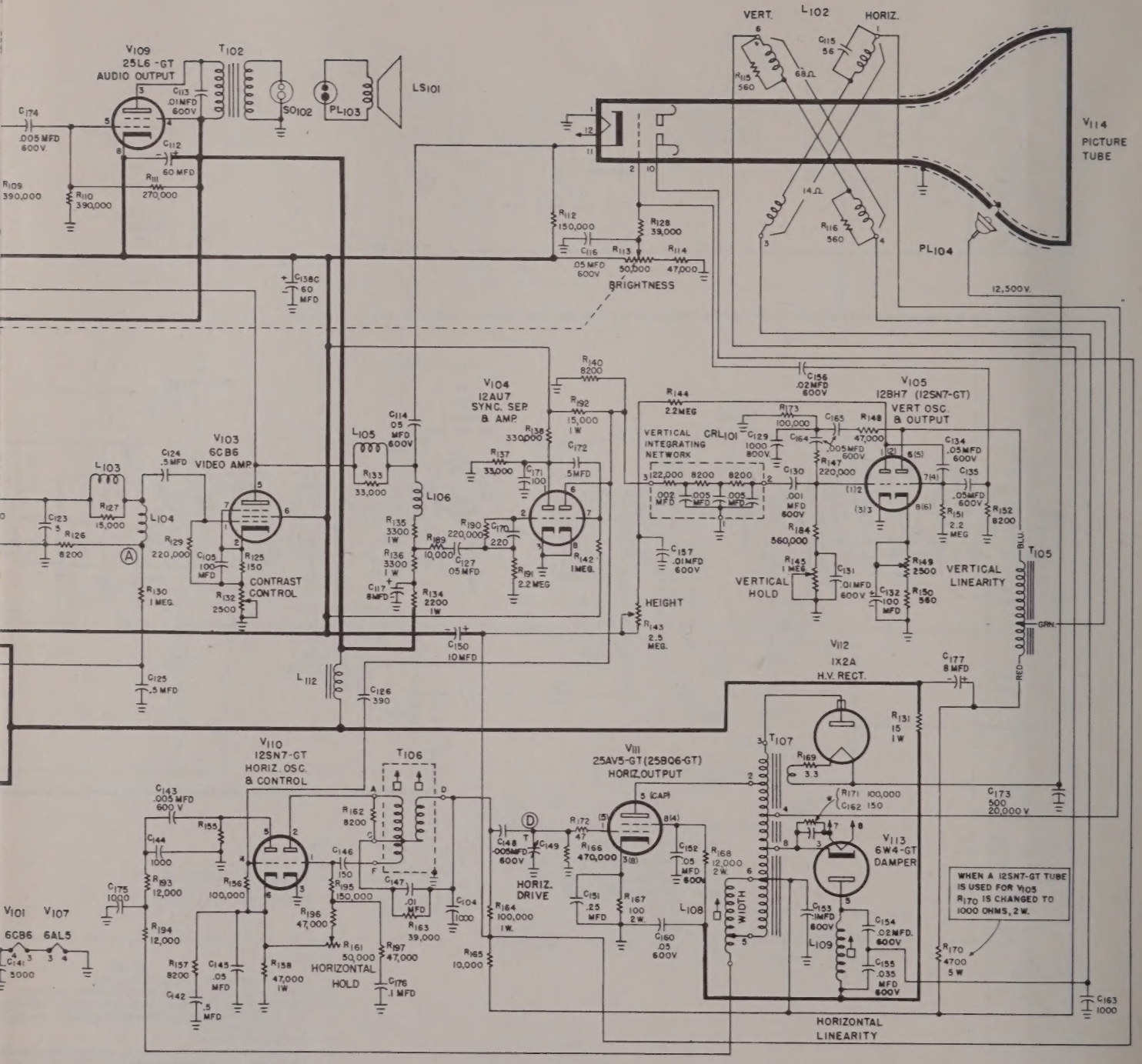
MODEL 20872

RUN 1



VALUES AND TOLERANCES SHOWN ARE NOMINAL AND VARIATIONS MAY BE FOUND. IT IS RECOMMENDED THAT THE VALUE OF ANY REPLACEMENT CORRESPOND TO THE NOMINAL VALUE OF THE PART BEING REPLACED.

89F375-2



* R171 & C162 WILL NOT BE FOUND IN ALL SETS; WHEN OMITTED, PINS 3&7 OF V-113 ARE CONNECTED TOGETHER.

89F375-2